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THE

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EDITED BY

THOMAS GADDES, L.D.S.ENG. AND EDIN.

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# List of Contributors of Original Articles to

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THOMAS GADDES, L.D.S. Eng. and Edin., *EDITOR.*

J. S. AMOORE, L.D.S.Eng.
GEORGE BENNISON, L.D.S.Edin.
A. H. BEST, M.D., L.D.S.I.
J. MORLEY DENNIS.
W. ST. GEORGE ELLIOTT, M.D., D.D.S.
CHAS. W. GLASSINGTON, M.R.C.S., L.D.S.Edin.
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W. J. PIDGEON, L.D.S.Eng.
FREDERICK ROSE, L.D.S.Eng.
C. J. BOYD WALLIS, L.D.S.Eng.
FELIX WEISS, L.D.S.Eng.

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THE

# DENTAL RECORD.

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## CASE OF TRISMUS.

By George Bennison, L.D.S.Edin.

Very little is to be seen in the various text-books concerning Tetanus, and certainly nothing about Trismus being induced by having teeth fractured.

A case recently came under my observation, and I should be glad if other practitioners would give their experience in similar cases, being quite sure it would be of great service to the majority of their professional brethren.

On Tuesday, Oct. 30th, W—— P——, a police constable, came to me in some alarm, being unable to open his mouth, and having great difficulty in swallowing liquids. He was not able to put solid food between his teeth. From what I could gather, he had been suffering greatly (evidently from the wisdom tooth pressing forward on to the second molar), and had gone to a chemist for relief. In the attempt to extract the tooth the crown was broken off close to the gums, and a small portion of the alveolus splintered. Then, to relieve the pain, creosote was applied. The parts were much swollen by the next day, although he took very little notice; but, as it did not lessen in size in five days he applied to the divisional surgeon, by whom he was referred to me.

On examination I found the parts highly inflamed and extremely sensitive, and with the appearance of the tooth having been driven back into its socket. As probing gave him great pain, I directed him to use warm fomentations, poppy heads, etc., and to come again next day. On the 31st the jaw was much easier, and I could make more minute observations. On November 1st it was more painful and rigid, in consequence of which I determined to remove the offender next day. I did so, with the assistance of Dr. Keith Welsh, the patient being under the influence of nitrous oxide. I separated the jaws by means of Coxeter's screw gag, and used the curved elevator. Directly consciousness returned the patient experienced great relief, being able to move his lower jaw with ease.

However, on the 3rd he was unable to move it to any great extent, as it was attended with severe pain. I advised the continuance of warm fomentations, and gave him a saline purgative.

On the 5th the swelling had decreased, and the movements of the jaw were attended with less pain. By the 8th great improvement had taken place; he was able to take solid food, and before the 15th mobility was completely restored.

The tooth was of normal size, but had a small growth (exostosis) at the posterior part of the fangs.

## NOTES FOR STUDENTS.

By the Editor.

### THE TREATMENT OF PATIENTS.

In greeting a patient who has called to consult you, endeavour to have some preliminary conversation, so as to avoid any unseemly abruptness and to quiet any nervous misgivings patients not infrequently have, especially when they are compelled to visit a Dentist. An unnecessary display of instruments often has an intimidating effect, and to avoid such exhibitions is at all times becoming, however elaborately the instruments or cases may be got up. Supposing you have ascertained that the object of the patient's visit is to consult you about an aching tooth, before looking at the tooth it is desirable to have some general idea of the condition of the troublesome member. There should at once be brought before your mind the several common causes of toothache, as:—

1. The exposure of sensitive dentine, as in the case of a simple carious cavity, or the recession of the gum from the neck of a tooth.
2. Irritation and inflammation of the pulp from approximate or actual exposure, or from intrinsic calcification.
3. Periostitis from suppuration of the pulp, the presence of foreign substance—tarter, bristle of tooth brush, splinter of tooth-pick, bone, &c.—mechanical violence, or constitutional causes.
4. Suppuration of Dental periosteum, as alveolar abscess.
5. Dental exostosis.

Then proceed to ascertain the "subjective" evidence of the case, as the nature of the pain? when it is felt? how long it lasts? how long the tooth has been a source of discomfort? Each of these questions has pertinent significance, and the answers received not only give you so much information, but also afford a clue as to which, if to any, one of the foregoing common causes of pain in the teeth this particular case may be due. The significance of knowing the nature of the pain will be apparent by comparing the several forms of it as set forth under the head of "Symptoms" in the accompanying table.

| COMMON CAUSES OF TOOTHACHE. | DUE TO | SYMPTOMS. | TREATMENT. |
|---|---|---|---|
| Exposure of Sensitive Dentine. | Caries, abrasion, erosion, recession of gum from neck of tooth. | Dull, heavy pain, excited by heat and cold, acids, sweets, and touch, lasting a short time. | Filling, escharotics (Zn Cl.) |
| Irritation and Inflammation of the Pulp. | Approximate or actual exposure, or intrinsic calcification. | Throbbing, pulsating pain, usually coming on after assuming the recumbent position, and lasting two or three hours. Pain frequently of a neuralgic character. The severity of the pain is greater in acute inflammation than in irritation. | Endeavour to save pulp by antiseptics, capping, and filling; or devitalise and remove pulp, which is only conservative treatment available of intrinsic calcification. |
| Dental Periostitis. | Inflammation & suppuration of pulp. Presence of foreign substances—tartar, bristle of toothbrush, splinter of toothpick, bone, etc.; mechanical violence, constitutional causes. | Tenderness. Tooth passively relieved by firm pressure, as by biting: becoming elongated, and painful to touch. | Remove pulp causes or foreign substances. Secure "rest" for the tooth. Depletion, paint with Tr. Aconite and Iodine. Aperient. Appropriate constitutional treatment where necessary. |
| Suppuration of Dental Periosteum—as Acute and Chronic Alveolar Abscess. | Suppuration and degeneration of the pulp; also the other conditions mentioned as causes of Periostitis. | Pain and tenderness of tooth, swelling of gum and face, the latter usually going down and the pain disappearing in three or four days. Whilst the abscess is excavating the bone the pain is throbbing and acute. | Removal of all pulp substance if diseased and other cause, thorough cleansing, and antiseptic dressing, filling, etc. |
| Dental Exostosis (essentially a disease of periosteum manifested upon the cementum). | An altered nutrition of periosteum, arising from some local or constitutional cause. | Pain, frequently difficult to localise, having neuralgic characters, excited by alternate hot and cold fluid. There may or may not be tenderness of tooth, but as disease progresses the patient is more able to centralise the seat of disturbance. The symptoms of intrinsic calcification of the pulp closely resemble those of (nodular) exostosis. | Local application of Iodine. Administration of Iodide of Potassium or appropriate treatment. Replantation. |

And that table likewise supplies certain data from which may be inferred the value of ascertaining, as an aid to diagnosis, where the pain is felt. For instance, with acute inflammation of the pulp, with rheumatoid affections of the periosteum, and in some cases of neuralgia, paroxysms frequently come on at night.

Having obtained the patient's version of the symptoms, that "subjective" evidence should be compared with what "objective" evidence the case presents—with that which can be perceived by yourself. Too often will it be found that those two forms of evidence do not agree; and, should a want of concordance or corroboration arise, carefully go over the "objective" conditions; and, if it be found that the result of the second examination agree with that of the former one, then reject the discrepant portion of the patient's story. An example of this kind is met with in cases of difficult eruption, or disease of lower wisdom teeth, where the patient complains of pain in the region of the bicuspids. To act upon the "subjective" evidence in such instances would be the loss of a bicuspid, and yet the cause of, and, consequently, the pain would continue. This is an instance of transmitted nervous impulse—transmitted from the seat of injury or disease, along the nerve trunk to the peripheries in the region of the bicuspids or mental foramen. That the patient truthfully describes the existence of pain in that region there can be no doubt; but that particular symptom when considered abstractly, does not agree with either the visible sign of disease, or the results of recognised treatment. The charlatanism of treating effects and not causes, which is one of the lessons contained in this paragraph, is further exemplified in cases of reflex disturbance—as blindness, eruptions, &c.—from Dental disease, hysterical lameness, pain, &c. As a rule "subjective" evidence, though at all times desirable, should be estimated as of less value as a means of diagnosis than those conditions that are objective and evident.

Avoid all unnecessary questions. Let each query have an object and have some bearing upon the line of inquiry. Yet, sometimes, it is politic to ask an irrelevant question, for it may be desirable to withhold from the cognisance of the patient that you are obtaining facts which he does not of his pleasure wish you to know.

Now, if you have, from the patient's description of the case, reason to think that the pulp is exposed, or nearly exposed, don't recklessly try to confirm such a theory by probing the carious cavity. By so doing the probe may come in contact with the pulp and great pain be induced; or if the pulp be almost, but not absolutely exposed, the probe may break through the thin covering and do considerable damage as well as cause severe pain. The proper means to adopt is to protect the tooth with a napkin (or at once put on the rubber-dam), dry the cavity, and carefully lift off the flakes of carious dentine, avoiding the region of the pulp. Let each stroke of the excavator be well directed and with a definite object. Having in that manner cleared away the softened dentine, &c., from the edges and greater part of the cavity, approach the area of the pulp with the greatest care and delicacy of touch. By such means will you be able to get very near to, if not actually lay bare, the pulp; and do so in very many cases without giving any pain. If the pulp is suppurating, the purulent matter has an odour which may be regarded as almost characteristic; and if that odour be perceived the suppurating condition of the pulp is indicated.

Whenever it is possible let a napkin intervene between your fingers and the lips and face of the patient; and there is neither object, elegance, nor pleasantness, in covering the patient's face with your hands as some men do. Particularly when using instruments, such as the drill and the engine, do not permit the metal to touch the lips. To use a small napkin, neat and clean, in this way is not only more pleasant to the patient and to your own feelings, but it also, in a great many instances, increases the amount of light reflected into the mouth. At all times when using dressing substances, especially carbolic acid, thoroughly protect the lips and mouth with a napkin. When strong carbolic acid touches the skin of the lips, excoriation and, at times, temporary injury to personal appearance, follow. When such is the result of culpable negligence, the aroused acrimony of a patent might lead to an action in a court of law for *mal praxis*.

Cultivate delicacy of manipulation, a light touch, and avoid pounding in the mouth, as the novice would the keys of a pianoforte. The operations of Dentistry do not, as a rule, require a great display of physical power, but rather a judicious and carefully-directed amount of force. In this respect ever observe the philosophic maxim, "least action." Avoid all unnecessary expenditure of energy, whether it be in the manner of interrogating, or even in the position and arrangement of instruments.

Be candid and truthful to your patients. Do not say, "I shall not hurt you," when, with the very next movement, you, it may be intentionally, come in contact with a living pulp, or some sensitive part Particularly with children is such practice to be deprecated, for every time their confidence in you is broken does the difficulty in managing. them increase, apart from the bad moral effect that a lie has upon a young mind.

Do not inflict undue pain. Many Dental operations at the hands of some men are really little short of torture. It is said "the world is full of evil." Perhaps the poet, when he wrote that line, had recently been to an unmerciful Dentist. Gentleness, kindness, truthfulness, persuasiveness, and, at the same time, firmness, are compatible with producing the best work, while those qualities inspire respect, confidence, and assistance on the part of the patient—valuable aids not to be despised.

Treat hospital patients as you would private patients. Cultivate in your practice upon the former the habits here pointed out. It is the observation of small and what might appear as insignificant details that undoubtedly lead to success. The great mountains of the physical world are made up of atoms and molecules ; therefore, do not deride small things.

## SUDDEN EMERGENCIES.

By W. J. Pidgeon, L.D.S.Eng.

The cases dealt with in the following Paper, which contains, for the most part, extracts from reliable sources, cannot strictly be said to come within the scope of Dental Surgery ; they belong rather to the broader province of Medicine and General Surgery. Yet a partial knowledge of them, at least, is necessary to us all, and with some of the Emergencies of which I shall speak we cannot be too thoroughly acquainted. I allude to those which are liable to occur in connection with certain of the operations in our specialty.

The College of Surgeons of England has marked its sense of the importance of this knowledge to Dental Surgeons by including it in a list of subjects with which a candidate for the Dental Diploma must be familiar.

The treatment here given is chiefly such immediate action as would be applicable in most cases pending the arrival of a medical practitioner or surgeon, the necessity for whose presence is in some cases a question for individual judgment. It is fortunate that the most valuable immediate treatment of these Emergencies is usually such as does not need the aid of artificial appliances, but depends almost entirely on simple measures and the coolness of those present.

I propose first to consider the general treatment of Coma, Insensibility or loss of Consciousness, from unknown or only suspected causes, and afterwards the symptoms and treatment of some of the more common of its many special forms.

The term *Coma* implies a state of insensibility more or less complete, having for immediate cause some abnormal condition of the brain. Complete coma indicates perfect insensibility and absolute cessation of the cerebral functions. Hence, in this state, there is an entire loss of perception and sensation, and of control over the voluntary muscles.

The GENERAL TREATMENT of Coma from causes unknown or only suspected is as follows :—The patient should be placed comfortably in the recumbent position with the head a little raised, the clothes about the throat and chest being loosened and fresh air freely allowed. If it is suspected that the coma is due to poison taken into the stomach, use a stomach-pump, if one is at hand, except in case of corrosive poisoning, when the instrument is likely to do more harm than good.

In unconsciousness due to injury of the brain, the chief measures for rousing the patient are shaking and calling loudly, dashing cold water over the face and chest, applying mustard poultices to the back of the neck, and keeping up artificial respiration if breathing fail.

The SPECIAL CAUSES of Coma to which I alluded are Syncope or Fainting, Epileptic Fits, Hysteria, Apoplexy, Convulsions, and Asphyxia. These we will take in their present order.

(1.) *Syncope, or Fainting.*

Its SYMPTOMS may be gradual or sudden. There may be a premonitary sound, or a gasping breathing and slight sighing. When the syncope is complete there is perfect insensibility with dilated pupils, death-like paleness (in some cases convulsive movement), and a slow, weak, irregular action of heart and lungs, which may cease altogether, causing death.

TREATMENT.—Remove at once any known reflex cause. If the patient be seated it may often be prevented by bending his body forward and bringing the head low to aid the return of blood to the brain. When, insensible place the patient in the horizontal position with the head low, loosen the clothing about the neck and chest, give fresh air, whip the face lightly with a cold wet cloth. A little brandy may be rubbed with the finger inside the mouth.

In dangerous cases send for a medical man, and in the meantime put cloths wrung out of hot water over the heart. If breathing flags take to artificial respiration.

Under certain circumstances, however, it is not wise to interfere with the syncope. Such is the case when it follows hæmorrhage, when the slow action of the heart may be essential to the arrest of bleeding. In such an instance to artificially increase its action might lead to serious consequences.

(2.) *Epilepsy* usually develops itself between the years of ten and twenty, and especially about the period of puberty. Sex appears not to have any special influence in regard to it. It seldom happens that any immediate exciting cause of a fit can be made out, and it is rarely that the fit ends fatally. It is sometimes a result of nerve irritation from diseased teeth. Mr. John Tomes mentions two instances of epilepsy which came under his personal observation, resulting from this cause, exostosis of the roots of the teeth being a marked feature in each case. It is worthy of note that the teeth which lead to such reflex trouble as epilepsy, trismus, tetanus, and other affections of the muscular system, or to disordered nutrition of parts distant from such teeth, seldom give any local sign stronger than discomfort, and generally not even this.

The SYMPTOMS assume one of two forms. One of these is marked by a sudden loss of consciousness, lasts for a few seconds only at the most, and is accompanied by slight paleness and then duskiness of the face, with loss of all expression, dilated pupils, and often slight spasmodic muscular movements, with a little squinting or choking.

In the other form, which is more severe, there are two stages. In the *first stage* the patient usually gives a disagreeable cry, yell, or moan, becoming at once unconscious. There is a temporary stoppage of respiration and hideous distortion of the features, limbs, and body, owing to the unequal nature of the tonic spasms.

In the *second stage* the spasms which before were tonic become clonic, and rigidity gives place to convulsions.

TREATMENT.—During a fit it is well in most cases not to interfere actively, merely taking care the patient does not injure himself, without attempting to check his movements more than is necessary for this object. A pad of some kind or a piece of soft wood should be placed between the teeth to prevent injury to the tongue or cheek, which otherwise may be much wounded. If a fit does not terminate in about ten minutes, cold water may be dashed on the face and chest; and if it is dangerously prolonged the patient may be put into a warm bath and cold water poured over the head while the body is submerged, or ice may be applied to the head or spine.

After a fit the patient should be kept quiet and allowed to sleep.

(3.) *Hysteria* is a nervous disorder, the exact seat of which cannot be localised, though probably the brain is the part most disordered.

It is extremely rarely met with among men, and even then it seldom causes an actual fit. Hysterical fits usually occur when others beside the patient are present, and are not sudden, but gradually worked up to, not being preceded by any peculiar cry such as occurs in epilepsy. During the fit unconsciousness is not complete, as may be proved by touching the conjunctiva. The patient is usually aware of what is going on, and looks out under her eyelids from time to time. It often happens that there are general spasmodic movements, and the sufferers struggle violently and throw themselves about. During these movements, which may last a few minutes or for hours, there is no lividity of the face, or any other sign of asphyxia, and the pulse is normal. This affection, though alarming, is not a dangerous one.

For TREATMENT little interference is necessary as a rule. It is important to get rid of the crowd of persons who are apt to surround the patient, who should be treated with as much firmness as kindness. The clothes about the neck and chest should be loosened and fresh air allowed. The face may be whipped with a cold wet cloth, ammonia applied to the nose, and given internally when swallowing is possible. The convulsive action should only be so far restrained as to prevent the patient injuring herself by it.

These hysterical seizures are sometimes partially or wholly simulated. When this is suspected an effective restorative is to hold the fair deceiver's mouth and nose so as to convert the "fit" into a struggle for breath. By this means the truth will soon be discovered.

(4.) *Apoplectic Seizure or Fit.*—This is a sudden attack of coma without convulsions. It may arise from cerebral congestion, cerebral or arachnoid hæmorrhage, or from a sudden deficiency of blood in the brain.

The SYMPTOMS are extremely variable and inconstant. There is usually an altered colour of the face, slow, laboured, or stertorous breathing, and paralysis commonly results.

In these cases send for a doctor at once, and meantime place the patient in a recumbent posture, in bed if possible, with the head high. Loosen the clothing about the neck and chest, allow plenty of fresh air, and order perfect quiet. This condition stands in ominous contrast to the one we last considered. In that there was much sound and fury of little significance; in this there is quietness and danger.

(5.) *Convulsions* may be slight and localised, unilateral, or general. They are commonly attended by partial or complete insensibility. In children a series may occur from a very slight cause. Convulsions is an affection principally found in the period of the first dentition, a time when the nervous system easily becomes over excited; at puberty, and at the change of life. In the latter case it is commonly associated with hysteria.

In childhood the most common causes are teething and indigestion.

Its chief dangers arise from (*a*), implication of the respiratory muscles, leading to grave interference with breathing; (*b*), obstruction to the return of blood from the brain; and (*c*), exhaustion produced by the fits.

For TREATMENT first remove the cause if possible. In the case of an adult proceed as before prescribed, modifying the course of action in accordance with the condition associated with it, whether it be epilepsy, hysteria, tetanus, or other ailment.

If a child is the sufferer suspect a tooth about to be cut, or irritating food in the stomach or bowels, as one of these is nearly always the cause of the trouble.

If the gum is pale over a coming tooth it should be lanced, but to lance the gum prematurely is worse than useless, as the resulting cicatrix will form a greater barrier to the advance of the tooth than the uncut gum could do. The pale points only should be lanced. In case the child has taken indigestible food quite recently, so that there is reason for supposing it still remains in the stomach, an emetic may be given, but if it is likely to have passed into the bowels a dose of castor oil will be a good remedy.

If, after the lance has been used, or the remedy has been given, the convulsions continue, place the child in a sitting posture in a warm bath containing mustard. Then pour cold water over the head, or apply ice to it, to drive the blood from the brain. A substitute for the warm bath is mustard plasters applied to the back of the neck, to the stomach and extremities. But supposing you *know* the cause of trouble is undigested food, and the little patient is already convulsed, so that you cannot give your emetic or aperient; then have cloths wrung out of hot water and place them over the abdomen. These will have a soothing effect by depleting the vessels of the irritated stomach or bowels. Convulsions require immediate action, and the treatment described should be in progress on the arrival of a doctor.

(6.) *Asphyxia.*—This condition is especially interesting to the Dental Surgeon, as it is one with which he should always be prepared to deal when administering an anæsthetic, or making an extraction.

Insensibility from asphyxia is due chiefly to the imperfect æration of the blood, which, being charged with carbonic acid, or other gas, acts on the system generally, and especially quickly on the brain and spinal cord, as a poison instead of a nutrient.

SYMPTOMS.—At first there are unusual efforts to breath, which gradually cease as the central nervous system ceases to act. The patient becomes unconscious. The face may be purple or livid, in some cases deadly pale or mottled. The insensibility increases and ends in complete coma. The pulse is then very feeble and frequent, but continues to beat after the lungs have ceased acting. The heart's action continues even when the pulse is imperceptible, but at last, in fatal cases, it ceases altogether, and death follows.

Asphyxia may result from various causes, as drowning, breathing smoke in a burning building, constriction of the throat by hanging or garrotting, a foreign body in the larynx, or taking too much of an anæsthetic.

It is the asphyxia arising from the two last causes which especially interests us as Dentists, as it is with this that we are most liable to have to deal.

TREATMENT.—First remove the cause if possible. Then pull the tongue well out of the mouth that the glottis may be open, and at once commence artificial respiration, as the first object in cases of asphyxia is to maintain the action of breathing. Give the patient plenty of fresh air, and loosen the clothing about his neck and chest. A little brandy or other stimulant may be rubbed inside the mouth.

On considering the causes given above it will be obvious that breathing in some cases cannot be restored through the mouth or nose. Such, for instance, is the case in what is known as a choking fit, due to some foreign body, such as a tooth, or a crumb, irritating the larynx, causing spasmodic contraction of the muscles which close the glottis, and thus shutting off the air from the lungs.

It is this spasm of the glottis which has led to several deaths of late years during the extraction of teeth, and it is highly important to know how this most dangerous symptom should be dealt with. If it is not treated instantly and effectively a sudden fatal result is very liable to follow. A medical man in such a case would arrive only to give a certificate of death.

The IMMEDIATE TREATMENT in such an instance consists in the operation of laryngotomy, which, if necessary, may be followed up by the treatment before mentioned till the surgeon's arrival, who may then perform trachæotomy, if advisable.

A simple and rapid method of doing laryngotomy is to place the nail of the forefinger on the depression between the thyroid and cricoid cartilages, and pass the blade of a penknife horizontally over the nail into the larynx, taking care that it does not penetrate too deeply and wound the back of the cavity. After the knife has entered the larynx give it a half-turn, and hold it in that position till a tube of some sort can be inserted to take its place. The horizontal position of the blade, with its flat surfaces facing upwards and downwards, is adopted in introducing it in order to avoid wounding the crico-thyroid artery, which runs *transversely* across the membrane of the same name, through which the knife has to pass. After the blade has penetrated safely into the larynx it can be turned till its flat surfaces are directed laterally without risk of cutting the artery, and this latter position opens the incision and allows air to enter to the lungs.

When this operation is successfully done there is little further danger.

This concludes the present short list of Emergencies. Of their proper treatment the public generally are ignorant, which makes it important that we ourselves should be well acquainted with it.

It will soon become generally known that a Dental Surgeon has passed through a hospital, and if he should be present in any of these sudden cases he will naturally be looked to for greater knowledge and assistance than could be expected from any non-medical member of society. If, then, at the moment of danger he be found wanting, he would certainly incur the censure of others, as well as his own self-reproach.

## ELECTRICITY: AND THE ELECTRIC LIGHT: IN REFERENCE TO DENTISTRY AND SURGERY.

By C. J. Boyd Wallis, L.D.S.Eng., &c.

### Part VII.—Batteries Continued.

Smee's Battery.—This single fluid battery, invented by Alfred Smee, F.R.S., Surgeon to the Bank of England, is similar in design to Wollaston's, but the position of the plates is reversed, thus there are two + plates to one — plate, instead of two — to one + ; consequently the zinc plate has not to be so often removed. It consists of a silver plate with a zinc plate doubled up U shape, so as to present a front to each side of the silver plate; the latter is platinised with a rough coating of finely-divided platinum, which lessens the adhesion of the hydrogen bubbles to the plate, and improves the constancy of the battery; nevertheless, the current rapidly falls. The exciting fluid is dilute sulphuric acid. The above is about the best and cheapest form of this battery, but platinum plate is sometimes used instead of silver; and roughened copper instead of zinc. This battery was formerly much employed in the Austrian telegraph service.

*The Tyer Battery* is an improvement upon Smee's, and has been much used in the English telegraph service.

*Ebner's Battery* is also somewhat similar to Smee's, but in it platinised lead in place of platinised silver is used.

Grove's Battery.—This battery was devised by Sir Wm. Grove, F.R.S., in 1842, and is used for telegraphic and other purposes when a powerful action is required. It has a greater E.M.F. and smaller internal resistance than Daniell's cell; the E.M.F. of one cell is about 1·9 volt. A battery of from forty to sixty cells is efficient for the production of a serviceable arc electric light, but it will not last more than from two to three hours; whilst, from two to three cells will produce a serviceable light from an incandescent lamp of about two candle power for surgical and microscopical purposes; and one cell will drive a small electro-magnetic engine, or raise to a bright red heat two or three inches of fine platinum wire.

This battery is composed of an outer cell of glass, glazed ware, or ebonite, which contains an amalgamated zinc plate of cylindrical form, and dilute sulphuric acid (one acid to eight water); the zinc plate is open on one side to permit of a free circulation of the dilute acid. Within the zinc a porous jar, containing strong nitric acid and a piece of platinum foil, is placed; the platinum, which is bent into the form of a letter S, to increase its surface, serves as the negative plate. In the action of this battery the hydrogen, which is disengaged by the solution of the zinc in the dilute acid, in passing through the nitric acid to the platinum, decomposes the nitric acid and is itself oxidised, producing water and the heavy red-brown fumes of peroxide of nitrogen. This gas, unlike hydrogen, does not set up an opposing electromotive force with the zinc, and being soluble in nitric acid it does not form a film upon the face of the platinum, hence there is no polarisation. The internal resistance is considerably reduced by the good conducting powers of nitric acid. But the corrosive nitrous acid fumes make this battery very objectionable in practice; moreover, the high price of platinum, which, after much use, becomes very brittle and liable to break, renders it expensive. However, the platinum is not consumed, and it may be restored to its former elasticity and value by heating to redness.

CALLAN'S BATTERY is a modified form of Grove's, in which platinised lead is used instead of the platinum, and a mixture of sulphuric acid, nitric acid, and a saturated solution of nitre, is used instead of the pure nitric acid. It is claimed for this battery that it is equal in its action to Grove's, and is much cheaper. Another battery designed by Callan is composed of zinc in dilute sulphuric acid, which forms the positive plate; and cast iron, in strong nitric acid, which forms the negative. Here the iron becomes passive, strongly electro-negative, and does not dissolve unless the nitric acid becomes too weak, when the iron will dissolve with simultaneous disengagement of nitrous fumes.

BUNSEN'S BATTERY, sometimes called the *Zinc-Carbon*, and the *Electropoion Battery*, was invented in 1842 by Bunsen, Professor of Chemistry at Breslau. It is a modification of Grove's battery, and was, in fact, originally suggested by him. It may be taken as a turning point in the history of galvanic batteries, at which electrodes of carbon were introduced in the place of copper, silver, or platinum, and by which a considerable reduction in the prime cost was effected. But though the first cost of this battery is less than that of Grove's, it is more expensive to work, and is not so convenient to manipulate. The Bunsen cell, properly so called, has a cylinder of carbon immersed in nitric acid, and the porous cell, containing zinc and dilute sulphuric acid, is placed within it; but it is now more commonly made up as follows:—An outer jar of earthenware or glass contains a cylinder of amalgamated zinc, open down its side, and dilute sulphuric acid; within the zinc is a porous jar in which a carbon rod and nitric acid (sp. gr. 1·420) is placed. Hydrochloric acid may be substituted for the sulphuric, but it is more expensive. A fair proportion for the dilute sulphuric acid is one of acid to 12-15 of water; when the highest efficiency of the cell is desired one of acid to seven of water may be used, but this causes an extravagant waste of zinc by local action. Bichromate solution may be used in the inner cell, but with a slight loss of power.

The chemical action of this battery is similar to that of Grove's. The zinc is dissolved and converted into sulphate of zinc, the hydrogen of the sulphuric acid being set free. This, entering the porous jar, decomposes the nitric acid, forming water and nitric peroxide. Thus, $Zn + SO_4H_2 + 2NO_3H = SO_4Zn + 2OH_2 + N_2O_4$. Hence, for one volume of zinc dissolved, two volumes of nitric acid are decomposed, and for each double volume of nitric acid decomposed, a double volume of water is formed which dilutes the remaining acid, and a volume of nitric peroxide is also produced. The quality of nitric acid is thus being constantly reduced by decomposition and weakened by the additional water, at the same time becoming impregnated with nitric peroxide. Hence the Bunsen cell is inconstant, the strength of current gradually diminishing with the time; for the exciting fluids cannot be kept constant as in the Daniell cell, in which the copper solution is maintained in a saturated condition by the reservoir of copper sulphate. Therefore this battery will only work reliably for a period of from three to four hours, when the cells will require recharging. The nitric acid may be used two or three times if allowed to stand aside for a while to clarify. This battery, like the Grove, is objectionable on account of the nitric peroxide fumes which are highly deleterious to animal tissues, and render it necessary that it should be placed in the open air. It will continue to furnish a current for a longer time than the flat Grove's cells, on account of the larger quantity of acid contained in the jars, but it is less compact.

*Archerau* introduced another form of Bunsen's battery, in which the position of the electrodes and electrolytes are reversed, the carbon cylinder and nitric acid being in the inner porous cell. In consequence of the greater proportion of positive surface, this battery yields a greater amount of Electricity than the Bunsen.

BICHROMATE, CHROMIC ACID, OR CARBON BATTERIES.—These are more or less modifications of Bunsen's battery, in which the improvement chiefly consists in replacing the nitric acid of the Bunsen by bichromate of potash or chromic acid.

After being in use some time, batteries, in which the polarisation is prevented by nitric acid, disengage nitric peroxide fumes, and in order to prevent this the above salts are employed in one or other of the solutions now in use.

A common form is the following:—

| | |
|---|---|
| Potassium Bichromate | 4 parts |
| Sulphuric Acid | 4 „ |
| Water | 18 „ |

In this solution the liberated hydrogen reduces the chromic acid to the state of chromium oxide, which remains dissolved in sulphuric acid. Sesquichloride of iron is sometimes employed for the same purpose; it is reduced to protochloride. But, in these modifications the action of the battery is reduced, owing to their increased resistance over that of nitric acid. The following are the compositions of some of the solutions referred to:—

*Bunsen.*—Bichromate of potash, 5 lbs.; boiling water, 2 gallons.

*Prevost* (September 27th, 1870).—Water, 800; bichromate, 50; sulphuric acid, 50; chromic acid, 2.

*V. Barjon.*—Bichromate, quicklime, sulphuric acid.

*Bastet* (September 26th, 1871).—Bichromate, water, nitrates of ether, soda or potassa, and sulphuric acid.

*Dale's "Chloride" Battery.*—In the cell with the zinc, A—1½ oz., B—2½ oz., chloride of zinc and water, with a little mercury at the bottom of the cell. Outer cell, carbon; a saturated solution of bichromate, 2 parts; hydrochloric acid (common) 1 part.

*Dale's "Granule" Battery.*—Cell with zinc; chloride of zinc, 1 to 4 oz., according to size, and fill up with water; a little mercury at the bottom of cell; or the following solution will do equally well—chloride of ammonium, 1½ to 3 oz.; hydrochloric acid, 2 to 3½ oz.; and fill up with water. Outer cell, carbon block surrounded with Granule carbon, filled up with saturated solution of bichromate, 2 parts; hydrochloric acid, 1 part.

*Burr and Oliphant's Patent Battery.*—Inner cell; Burr's patent gilt zinc, with 1 oz. of the patentee's mercurial paste, and fill up with water. In constant work this paste should be renewed at the rate of ½ oz. per week. Outer cell, carbon plate and a saturated solution of bichromate with $\frac{1}{12}$th part of sulphuric acid.

*Trouvé's Bichromate Battery.*—Bichromate of potash, 3 oz.; sulphuric acid, 9 oz.; water, 20 oz.; or bichromate of potash, 150 grammes; water, 1 litre; sulphuric acid, 450 grammes. For a more rapid delivery M. Trouvé increases the quantity of bichromate from 200 to 250 grammes per litre. The bichromate is powdered and added to the water, agitated, and then the sulphuric acid is added, little by little; when the bichromate is dissolved it remains limpid, and does not deposit by crystallisation on cooling, nor does it form chrome alum crystals when the battery is in action. This solution should not be stirred with a wooden rod, as this would be rapidly carbonised, and thus weaken the solution.

*Chemical Action.*—Bichromate batteries may be said to act really by the chromic acid which is set free by the action of another acid, usually sulphuric. The zinc, dissolving in the sulphuric acid, liberates hydrogen; but the hydrogen, instead of appearing in the free state, reduces the bichromate. The re-action may be expressed as follows:— $K_2\ Cr_2\ O_7 + 4H_2SO_4 + 3H_2 = K_2SO_4 + Cr_2\ (SO_4)_3 + 7H_2O$. Thus zinc sulphate, potassium sulphate, and chromium sulphate are formed, and the two latter salts crystallise together with twenty-four molecules of water in the form of chrome alum.

Sulphuric acid is usually employed to act on the zinc in these batteries, but it is generally acknowledged that hydrochloric acid gives at least 5 per cent. higher electromotive force; thus, the E.M.F would be over 2 volts with HCl as against 1·8 with $H_2\ SO_4$. In addition to this the chloride of zinc which is formed is very soluble, and will not creep up the cells and crystallise as the sulphate does. The objections to hydrochloric acid are that it is about double the price of sulphuric, and that it gives off corrosive fumes. With sulphuric acid the E.M.F. falls rapidly, and as the chromic alum forms the resistance increases. Hydrochloric acid in the place of sulphuric remedies some of these defects. In a solution prepared with equal volumes of the saturated solution of bichromate of potash and of hydrochloric acid no crystals are formed.

*Chromate of Calcium.*—Owing to there being very little demand for this salt in the market it is more expensive than bichromate of potash, otherwise it might be usefully employed in these carbon batteries. It may be prepared by dissolving five parts of bichromate of potash in boiling water, and adding one part of quicklime (recently slaked) and 2½ parts of plaster of paris. It is precipitated as a yellow powder, and it requires one-fifth more acid than the potash salt. One-half of the lime is precipitated as sulphate on the addition of the acid, and the rest comes down during the action.

*Voisin's Red Salt.*—For those who do not wish to have the trouble and risk of acids this is a convenient form of compound salt which, with twenty to twenty-five parts added to 100 of water, makes a solution ready for use. It gives the same E.M.F. as the ordinary solution of bichromate, and is considered a little more constant, but produces a trifle greater resistance. It may be made by dissolving the sulphate of soda in the heated acid and gradually stirring in the bichromate; it is then poured into moulds, and, when cool, removed and broken up. Chemically it may be represented thus:—

$$\begin{array}{ccccc} Na_2SO_4 & + & 7H_2SO_4 & + & K_2Cr_2O_7 \\ 140 & & 686 & & 295 \end{array}$$

and in the change it undergoes by the action it probably becomes—

$$2NaHSO_4 + 2KHSO_4 + 2CrO_32SO_3 + 7 \text{ water.}$$

Grenet's or Poggendorf's Bichromate Battery.—This is a well known and useful form of an experimental battery where constancy of current is not required. The cell (Figs. 9 and 10) is in the form of a bottle, and consists of two carbon plates and one zinc. The carbons are fixed to a wooden or ebonite cover, and remain permanently in the liquid. The zinc plate is attached to a sliding rod, movable in a split brass tube fastened to the cover, by means of which the zinc may be raised from the liquid and the battery thrown out of action, thus waste of the zinc and the solution is prevented. The exciting fluid consists of bichromate of potash, 2½ parts dissolved in 20 parts of water, to which is added one part of sulphuric acid ; or one part of Voisin's chromic salt to five parts of water may be used instead of the former. This battery gives a powerful current for a short time, about fifteen minutes for a pint size cell, but it rapidly polarises.

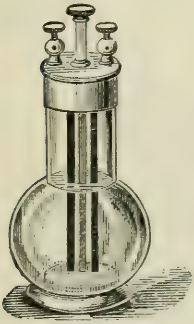

Fig. 9.

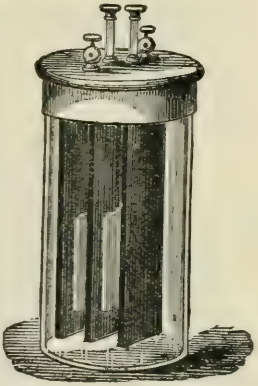

Fig. 10.

*Grenet* has introduced another form of this battery in which the same arrangement is retained, but he has added two glass tubes which extend through the cover to the bottom of the bottle, these are connected by a piece of gutta percha tubing by means of which air is introduced through the tubes to the battery, and so polarisation is prevented to a great extent, and the battery rendered very active.

Dr. Byrne, of Brooklyn, has adopted this plan of depolarisation in his battery with remarkable results.

Trouvé's Bichromate Battery.—This now famous battery is one of the best for electric lighting and motor purposes, it may be readily charged, and as readily manipulated, and is therefore one of the most convenient arrangements for Surgical and Dental uses. Mr. Armand Levy, 252, Goswell Road, London, is the agent in this country for the battery, and to him I am indebted for the illustration.

Each battery (Fig. 11) consists of a wooden box, containing six rectangular troughs of ebonite, which contains the liquid of each element. The elements are connected in series, the zinc of one cell being coupled to the two carbons of the next, and a winch and rachet enables the plates to be wound up out of the solution, or to be immersed to any desired extent.

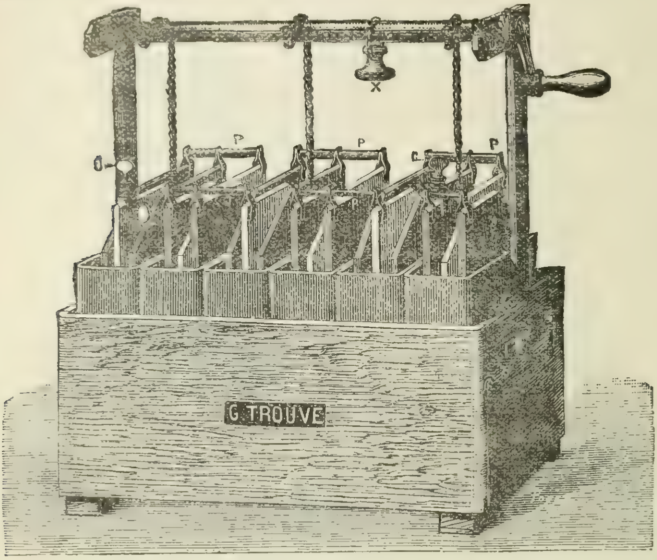

Fig. 11.

The medium weight of a battery of six cells is thus given:—

| | | |
|---|---|---|
| 6 Zincs .. .. .. .. .. .. | 7·680 | Kilogrammes |
| 12 Carbons .. .. .. .. .. | 5·460 | ,, |
| 6 Ebonite troughs .. .. .. .. | 1·620 | ,, |
| Contacts .. .. .. .. .. | 0·600 | ,, |
| Oak box.. .. .. .. .. .. | 3·000 | ,, |
| Iron standards .. .. .. .. .. | 2·300 | ,, |
| Liquid .. .. .. .. .. .. | 12·800 | ,, |
| Total weight .. .. .. .. | 33·460 | ,, |

or 67 kilogrammes for the two batteries. This weight might be readily reduced to 50 kilogrammes.

The elements are formed of a plate of zinc, and two plates of carbon, electro-coppered at the upper part. The zinc has a notch which serves to fix it to the metallic couplings covered with india-rubber, which supports the elements. Thus the zincs can be readily removed for amalgamation or replacement.

The liquid for a battery of six elements consists of water, 8 kilogrammes; pulverised bichromate of potash, 1·2 kilogrammes; sulphuric acid, 3·6 kilogrammes. The preparation of this takes from eight to ten minutes.

In the experiments made by M. E. Hospitalier, two batteries of six cells each, connected in series, were used to work six Swan lamps. During these experiments the elements were lowered into the exciting fluid by degrees, as required, from two centimètres at first to total immersion. The discharge was divided into two phases :—

*1st. Phase.*—The delivery maintained constant at 8 ampères during four hours and a quarter.

*2nd. Phase.*—The delivery decreasing regularly from 8 to 5 ampères during one hour and twenty-five minutes. Thus the following results were obtained :—

1.—*Constant Phase.*

| | |
|---|---|
| Difference of potential at terminals of lamp | 14·15 volts. |
| ,, ,, ,, batteries | 16·70 ,, |
| Intensity of current | 8 ampères. |
| Disposable electric energy in external circuit | 133·5 watts. |
| ,, ,, ,, ,, | 13·5 kilos. per sec. |
| Duration of constant phase | 15,300 seconds. |
| Quantity of Electricity furnished | 122,400 coulombs. |
| Total disposable Electric energy in external circuit | 206,550 kilos. |

2.—*Decreasing Phase.*

During the second phase the mean current was 6·55 ampères during one hour and twenty-five minutes, or 5,100 seconds, and the mean disposable Electric energy in the external circuit nine kilogrammetres per second.

These experiments show that each battery practically furnished ½ H.P. hour, the consumption of material being:—

| | |
|---|---|
| Zinc | 1,460 grammes |
| Bichromate | 2,400 ,, |
| Sulphuric Acid | 7,200 ,, |

The total quantity of Electricity furnished during the two phases was 156,000 coulombs.

Total disposable energy in the external circuit, 253,350 kilogrammetres.

M. Hospitalier states that five batteries, of six cells each, coupled in series, would suffice to support for five hours an arc lamp having carbons nine millimetres in diameter, with a current of seven ampères, and a difference of potential of 40 volts at the terminals of the arc. It is claimed for this battery of *twelve cells* that it will work a ten candle-power incandescent Swan lamp for thirty hours consecutively or at intervals, and a good and sufficient light for an office desk is obtained; and that it will work six lamps of eight candle-power each for a period of four hours without any decrease of light, and then for another hour, at a cost of about a penny a lamp per hour. It is said that M. Trouvé, during his experiments, has kept lit ten incandescent lamps for five hours, and twenty lamps for two hours, each giving a light of ten candles. For a lamp of from three to five candle-power a battery of three or four cells would be sufficient. The battery of twelve cells will work an electro-motor of half horse-power. The electro-motive force of a cell is two volts with fresh solution, and the intensity of current at the beginning on a short circuit is 118 ampères. The resistance is 0·07 ohm. Four batteries working a Gramme machine have produced fourteen kilogrammetres of work during two hours without weakening in power.

Dale's "Chloride" Battery consists of an outer round stoneware jar with an inner porous cell; a carbon plate capped with metal and terminal attached occupies the outer jar, and a heavy zinc rod, with strong attachment, the inner cell. The arrangement is seen in Fig. 12. The outer cell is filled with a saturated solution of bichromate of potash, two parts; hydrochloric acid, one part; and the inner cell with chloride of zinc, and fill up with water. A little mercury is put into the porous jar to keep up the amalgamation of the zinc.

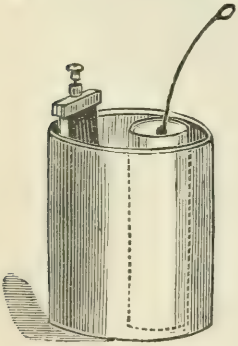
Fig. 12

It is claimed for this battery that one cell equals three ordinary Leclanché cells; it will work on short circuit with scarcely any polarisation for 50 hours; four cells have been working 200 bells at a hotel (upon which a Daniell battery of 16 cells had been previously used) for over three months without attention.

It is said to be superior to the original mercury-bichromate battery, and is suitable for working medical coils, telephone transmitters, telegraphs, railway signals, and other continuous work.

The electro-motive force is 1·56 volt. It is manufactured and sold by Messrs. H. and E. J. Dale, Electricians, 26, Ludgate Hill, E.C., to whom I am indebted for the illustrations.

Dale's "Granule" Battery is a modification of the "Chloride" cell, and is a little more powerful, the electro-motive force being 1·65. It is suitable for working medical coils, incandescent electric lamps of low resistance—one to five candle power—electro motors, &c. It, Fig. 13, consists of an outer stone-ware jar, in which the porous cell and the carbon plate are placed, both being surrounded with granules of carbon ; this outer jar is filled up with a saturated solution of bichromate of potash, two parts, and hydrochloric acid, one part. The porous cell contains the zinc and a solution of chloride of zinc ; or the following solution may be employed : chloride of ammonium, 1½ to 3 oz., hydrochloric acid, 2 to 3½ oz., according to size, and fill up with water. This battery will work a small Swan lamp for about 30 consecutive hours ; or, with intervals of rest, for about four to six weeks, and even longer if the zincs are removed from the solution when not in use. Four cells are sufficient for maintaining a Swan lamp of about three candle power.

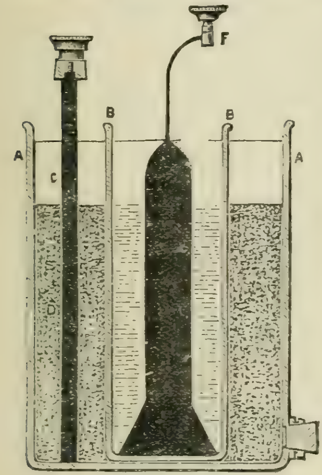

Fig. 13.

Leclanché's Battery.—There are several forms of galvanic batteries invented by George Lionel Leclanché, a French electrician. The first, patented August 23rd, 1867, and reissued February 17th, 1874, consists of a porous cup in which the carbon is placed, the remaining space being filled with a mixture of peroxide of manganese, chlorohydrate of ammonium, and sawdust. This cup is placed in a cell with the zinc element. One liquid is used containing a salt which has no chemical action on the peroxide of manganese, but which is capable, by its electrolytical decomposition, of rendering soluble the oxide of manganese. The salt commonly used is chloride of ammonium.

Another form, patented June 5th, 1866, and reissued February 17th, 1874, consists of a plate of copper with wire attached, which is covered in the jar with powdered carbonate of copper ; over this is placed a stratum of sand in which is imbedded the zinc with a wire attached. The whole is then saturated with a solution of chlorohydrate of ammonium.

The more modern Leclanché battery, which is now largely used for electric bells, telephones, and in local telegraph stations, is not very constant, but it rapidly recovers its primitive power when allowed to rest a short time, by the binoxide of manganese gradually destroying the polarisation. It is clean, convenient, portable, and gives off no unpleasant odours ; it will run for months or even years without renewing. I have had a battery of these cells in use for a period of over three years without any trouble save the addition of a little water to the cells to replace that lost by evaporation.

There are two kinds of this battery, one with and one without the porous cell; the latter is now mostly used. The first, Fig. 14, consists of a rod of carbon placed in a porous pot, which is then packed with a mixture of granules of carbon and binoxide of manganese; this is covered over with a layer of pitch. The positive plate is a rod of zinc to which is fixed a copper wire. The exciting fluid is a strong solution of sal-ammoniac. In the chemical action which occurs in this cell the zinc dissolves, forming a double chloride of zinc and ammonia, while ammonia gas and hydrogen are liberated at the carbon pole; the binoxide of manganese slowly yields up oxygen and destroys the hydrogen bubbles.

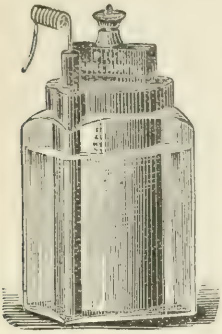
Fig. 14.

The internal resistance of this battery varies of course with the size, but is stated to be from two to three times that of an Ohm; and its E. M. F. about one third greater than that of a Daniell's cell, or 1·42. In the latter form, Fig. 15, the necessity of a porous jar is avoided by employing the binoxide of manganese in a conglomerate form and placed on each side of the carbon.

MONS. NIAUDET has introduced a modification of the Leclanché in which the zinc is placed in a solution of chloride of sodium, and the carbon is surrounded by chloride of lime, which readily gives up chlorine and oxygen, and both of these gases will destroy the hydrogen bubbles and prevent polarisation. This cell has a higher E. M. F. and less resistance than the Leclanché.

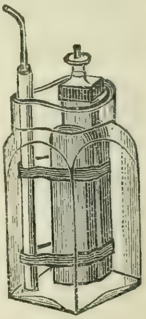
Fig. 15.

DE LA RUE'S.—This battery was invented by Mr. Warren de la Rue. It is a convenient, portable, reliable, and perfectly constant cell, easily worked, and requires little attention. It is suitable for medical purposes, or for making electric tests of submarine cables and instruments. It is very compact, 1,000 elements occupying a space of less than a cubic yard. An enormous battery of 11,000 of these cells was constructed by Mr. De la Rue and used by him and Müller in their investigations on the stratification of the electric light. The difference of potential between the first zinc and last silver of this large battery was over 11,000 volts, yet no spark would pass from the positive to the negative poles until they were brought to within less than a quarter of an inch of one another. With a battery of 8,040 of these cells the length of spark was only one third of an inch in air under the ordinary atmospheric pressure; while under a pressure of a quarter of an atmosphere the striking distance was 1⅕ inch. The electro-motive force of a silver chloride cell is 1·03 volt, and that of one made with silver bromide is 0·908; three silver chloride cells with one bromide, coupled in series, give an average E. M. F. of 1 volt. This battery consists of a stick of zinc, and a flattened strip of silver, the latter imbedded in fused chloride of silver, the two plates being immersed in a solution of chloride of zinc or chloride of ammonium, the whole contained in a glass tube or jar, closed by a cork or india-rubber stopper. As the zinc dissolves away and hydrogen is evolved at the negative plate the chloride is reduced to metallic silver, and deposited as the copper is in the Daniell cell, and is thereby recovered.

MARIÉ DAVY'S BATTERY, *or mercury sulphate battery*, is a zinc-carbon element of small dimensions. It consists of an outer and an inner or porous cell. In the outer cell the zinc plate with a solution of sulphate of zinc or brine is placed, and in the porous vessel the carbon dips into a pasty solution of mercurous sulphate. Chemical action takes place only when the cell is closed. The zinc decomposes the water, liberating hydrogen, which traversing the porous vessel reduces the sulphate of mercury, forming metallic mercury, which is deposited on the surface of the carbon or collects at the bottom of the vessel, while the sulphuric acid formed at the same time traverses the porous jar to act on the zinc and thus increases the action.

From the mercury so deposited a quantity of sulphate, equal to that which has been consumed, may be prepared. Furthermore the amalgamation of the zinc is assisted by the passage through the porous jar of a small quantity of the solution of the sulphate of mercury. The resistance of this cell is greater than that of the Daniell, and its E. M. F. is 1·52. It is rapidly exhausted when continuously worked, but is well suited for discontinuous work such as alarums and telegraphing, for which purpose it was largely used in France before the introduction of the Leclanché cell.

THE INSULITE SEALED BATTERY is a modified form of the Leclanché which was introduced by the British Insulite Company. The cells are made of the company's special compound "Insulite," they are seamless boxes formed by compressing the material under hydraulic pressure when warm. The cells are closed by a lid of the same material, which is soldered in and so closely joined as to prevent any "creeping" of the solutions employed. The terminals are nickel-plated which prevents them from becoming rusty, and thus avoids any interruption of the current from this too common cause. The loss of liquid by the upsetting of the cell, or by evaporation, is avoided by the closing in of the cell. It gives off no noxious fumes and contains no corrosive acids, the chemicals are not consumed except at the instant when the battery is producing a current, and the current is very constant. It is specially adapted for medical purposes, call bells, alarums, telephonic and telegraphic purposes. The internal arrangement of the cell is shown in Fig 16, where D is a carefully and specially prepared diaphragm placed diagonally across. The positive element zinc, zn, is placed in the special excitant ; and the negative element, c, is surrounded with granules of carbon.

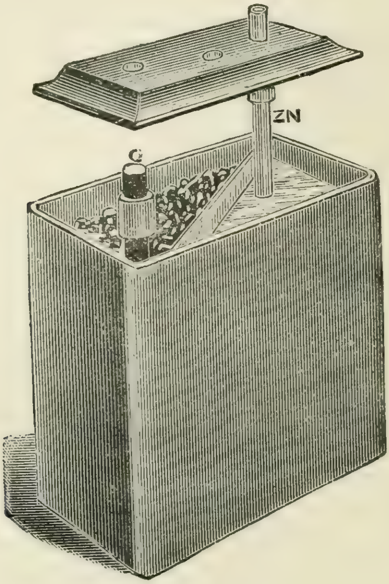

Fig. 16.

Fig. 17 shows an Insulite battery, with bell, bell push, and wire attached, conveniently arranged for use in the sick room. The electro-magnets and hammer are contained inside the dome of the bell, which is itself attached to an Insulite block. Another useful

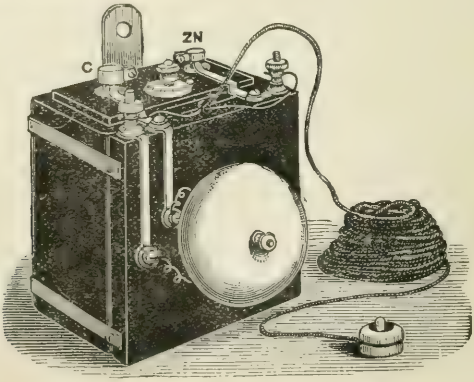

Fig. 17.

combination is the small Insulite battery and the detector galvanometer, for continuity testing and measurement of resistance. It is clean and always ready for use, the binding screws, &c., being free from rust owing to the nickel-plating.

According to the experiments with this battery, made by Dr. John Hopkinson, F.R.S., the electro-motive force of each cell was 1·5 volt, and the resistance was 6 ohms. After a month of very severe work, very much heavier than the Leclanché are ordinarily expected to perform, the E. M. F. had fallen to one half, and the resistance of each cell had increased to about 14 ohms, but when the cells were allowed to rest for a few hours the E. M. F. recovered to 1·2 volts.

That which differentiates this battery from others is the material of which the cells are made; when batteries are used periodically, under circumstances in which they can have no attention paid to them for many months, their durability depends on the perfection of the insulation of the containing cells.

The insulation resistance of one of the large cells was therefore determined by placing it upon a sheet of tin foil and ascertaining what current would be forced through from the fluid within the jars to the tin foil, by a difference of potential of about 50 volts. The insulating resistance of the cell was thus found to be 4,452 megohms: for all practical purposes this may be taken as absolute perfection.

(*To be continued.*)

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## DENTITION AS INDICATIVE OF THE AGE OF THE ANIMALS OF THE FARM.

By Prof. G. T. BROWN,

VETERINARY DEPARTMENT OF THE PRIVY COUNCIL.

*From the "Journal of the Royal Agricultural Society of England."*

*(Continued from page* 503, *Vol. III.)*

No particular importance can be attached to the tusks as a means of judging the age; they only occur in the horse, and are less regular than the other teeth in the time of their eruption. The small rudimentary teeth which sometimes exist in the place of tusks in the mare must not be taken into account at all.

There may in certain cases be reason to suspect that the mouth of the horse under examination has been manipulated, with the view to make the animal appear younger or older than it really is. Up to the age of five years it may be advantageous to the seller to convince the purchaser that the horse is above its real age; but as six years old is, according to general conviction, the period of equine perfection, an old horse gains by being made to appear as near that age as possible.

That the horse's mouth is sometimes subjected to certain processes for the purpose of deception cannot be doubted. Many young animals come into the market bearing evidence in the malposition of their teeth, or in the absence of some of them altogether, that violence has been employed to anticipate the natural process of eruption, but often in so bungling a manner that the object has been defeated. Early extraction of the temporary teeth facilitates the cutting of the permanent organs, and by commencing with the central incisors as soon as signs of their displacement are seen, and continuing the same system in respect of the lateral and corner teeth, the whole of the permanent incisors may be brought into the mouth soon after four years. The cutting of the tusks at this age is also facilitated by fitting a hot iron, cunningly arranged, over the points of the teeth which may be just pricking through the gum, and thus burning away the structure which would naturally almost obscure the organs from view.

Treated in the manner above described, the horse at four years off is accepted as coming five years old; but the expert is well aware that at the age of four years there are eight molar teeth which have only just approached the level of the others, and these enable him to distinguish with absolute certainty between a horse of four and another of five years old.

The clumsy expedient of excavating the centres of the teeth of old horses, and blackening the cavity thus made by means of a hot iron to represent the lost mark, is not likely to deceive any one who is familiar with the anatomy of the teeth, and the operation, which is dignified by the term "Bishoping," from the name of its inventor, is too laborious to be often performed; indeed, it may be allowed that the tricks which are played with horses' mouths are not so frequent, or so successful, as to constitute an important element in the question of the value of the evidence of age which is afforded by the teeth.

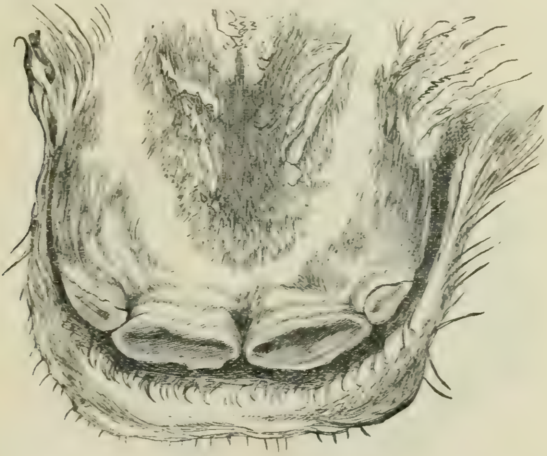
It is customary to calculate the ages of all thoroughbreds up to January 1, and of other horses to May 1. The terms "off" and "coming" are employed with the understanding that they mean the addition to or subtraction from the stated age of a few months. Thus, "three years off" is allowed to mean three years and about three months; and "coming four years" means that the horse wants about three months to complete the year. It is not essential that the examiner should conform to usage in respect of the terms above mentioned, unless he thinks fit to accept them, nor is he compelled to insist that the year shall be completed in all cases on the 1st of January or May. Where accuracy is required the statement of the opinion of a horse's age will be made absolutely, and without any reference to an arbitrary standard, which nevertheless may, for ordinary purposes, have a certain amount of convenience.

In reference to horses which are entered at a certain age at an Agricultural Exhibition, a question has more than once arisen as to the precise meaning or intention of the terms applying to the class, and the question has not yet been answered in a satisfactory manner. For example, an animal in the four-year-old class, in which a certificate of the year of birth only is required, has a condition of dentition which indicates that he is nearly five years old. This may be admitted by the exhibitor, but he also contends that the horse is a four-year-old until he has reached his fifth birthday. If this plea be allowed, it is obvious that a horse foaled in the beginning of the year may have to compete with one which was foaled late in the same year. It may, however, be suggested that the statement of the day of birth will at once dispose of this difficulty.

## EVIDENCE OF THE AGE OF THE HORSE DURING TEMPORARY AND PERMANENT DENTITON.

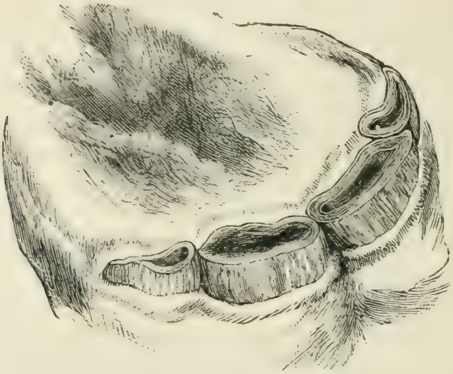
At birth the foal has the two central temporary incisors somewhat laterally placed, in consequence of the jaw not being wide enough to accommodate them both in front. The teeth are nearly covered with the gum, and only a small portion of the upper anterior edge is to be seen free from the membrane. In some cases the extreme corners of the lateral incisors are to be detected in outline under the gum. The three temporary molars are usually entirely covered with gum at the time of birth. This state of the mouth is shown in the next drawing (Fig. 3), which was taken, on the morning of its birth, from a cart-colt foaled at the Royal Agricultural College Farm.

Fig. 3.—*Incisors of Colt at birth.*



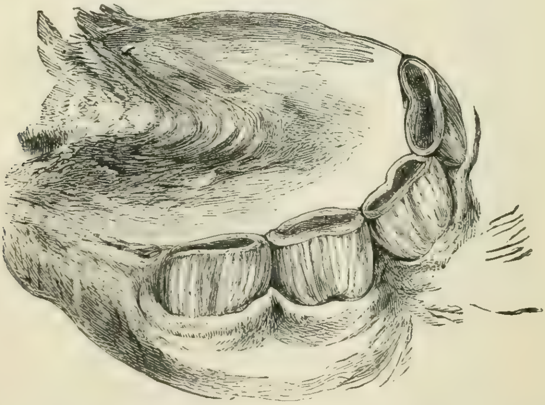
By the end of the second week after birth the central incisors will be fairly in the mouth, and in six or eight weeks the lateral teeth, and also the temporary molars, are well up. In the illustration (Fig. 4), the state of the incisor teeth at two months old is shown. The central incisors at this age have the surfaces very slightly worn, and the cavity or infundibulum is not surrounded by a line of worn structure ; only the anterior edges of the teeth have yet been subject to attrition. In the lateral incisors the wear is confined to a small portion of the anterior edge which is nearest to the central teeth. These appearances are indicated in the drawing (Fig. 4).

Fig. 4.—*Incisors of Colt at two months.*



Between two and six months old the central and lateral incisors increase in size with the growth of the animal. At six months old the mouth has a very neat and compact appearance. The centrals and laterals are well developed, and their anterior edges are worn level. The posterior edges are, however, still rather below the anterior, and the table, therefore, is not perfectly formed. The next drawing (Fig. 5) was taken from the mouth of a cart-colt at the age of six months.

Fig. 5.—*Incisors of Colt at six months.*



Soon after seven months indications of the cutting of the corner teeth may often be seen, and in many instances the points of the teeth will be observed pricking through the gum. At nine months old the colt will have the corner incisors in the mouth with their extreme anterior edges in apposition, leaving a triangular space, which is seen most perfectly on a side view when the lips are slightly separated.

At this period the fourth molar, which is a permanent tooth from the first, begins to protrude through the gum, and by the time of the completion of the first year it is level with the temporary molars ; but its surface is not worn, and the recent appearance of the tooth is most important as evidence of the age of one year.

The illustration (Fig. 6), shows the condition of the molar teeth

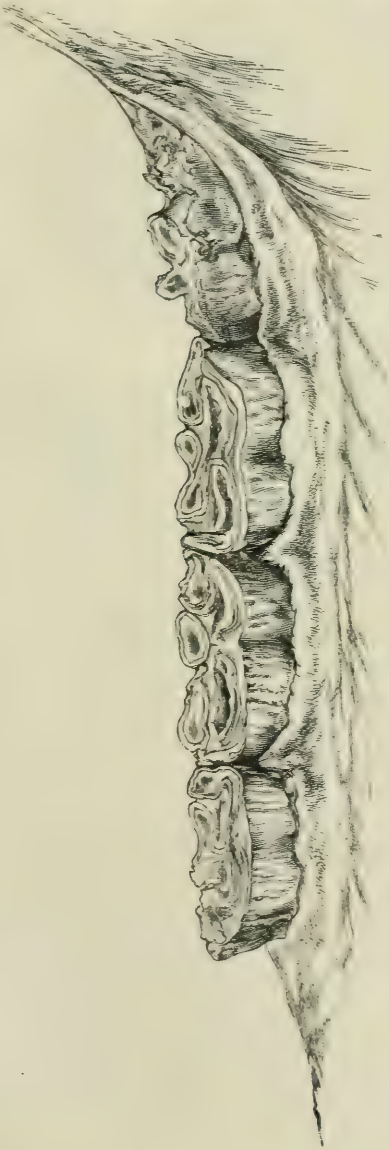
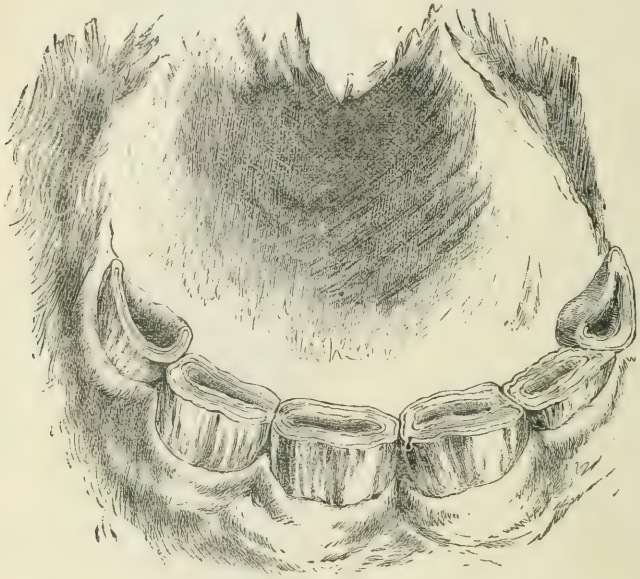


Fig. 6.—*Molar Teeth of Colt at one year.*

at the completion of the first year. Three temporary molars have the upper surface worn, and are thus readily distinguished from the fourth molar, which has only recently been cut.

The next illustration (Fig. 7), shows the shell-like character of the corner teeth, and the state of the tables of the other incisors in the one-year-old colt; and it may be remarked that the appearances correspond with those of the teeth of the five-year-old horse; the chief difference being that in the yearling the teeth are temporary and in the five-year-old permanent organs.

Fig. 7.—*Incisors of Colt at one year.*



(*To be continued.*)

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## ON THE RELATIONS BETWEEN DENTAL LESIONS AND DISEASES OF THE EYE.

By HENRY POWER, M.B.Lond., F.R.C.S.,
*Ophthalmic Surgeon at Bartholomew's Hospital, and Surgeon to the Royal Westminster Ophthalmic Hospital, &c.*

(*Continued from page* 559.)

Having, however, established the existence of reflex irritation of the eye, it will perhaps be the best mode of treating of the various modes in which that irritation may express itself, if we consider it under the three following heads:—

1. Reflex irritation affecting striated and unstriated muscle.
2. Reflex irritation affecting the mucous membrane and cornea.
3. Reflex irritation affecting the optic nerve and retina, and intra-ocular tissues.

In regard to reflex irritation affecting muscular tissues, we may mention—

1. Paresis of the ciliary muscle.
2. Paresis of the intra-orbital muscle.
3. Paresis of the muscular fibres of the iris.
4. Paresis of one of the ocular muscles.
5. Paresis of the orbicularis palpberarum muscle.

One of the commonest forms of visual disturbance, induced by Dental disease, is *loss or failure of the power of accommodation.* By power of accommodation is meant the faculty which the eye possesses of adjusting its refraction so that well defined images of objects situated at different distances from the eye may be formed upon the retina. This is accomplished, as is now well known, by the action of the ciliary muscle, which, by contracting, causes the lens to become thicker. For the lens is normally and, when the eye is at rest, covered anteriorly, and flattened by the anterior capsule, which is stretched by the suspensory ligament; but when near objects are fixed, the ciliary muscle is brought into play. This brings forward the anterior part of the choroid, and relapses the suspensory ligament, and the lens immediately, by virtue of its own elasticity, becomes thicker, and is thus rendered capable of focussing divergent rays—that is to say, rays proceeding from near objects. The stronger the muscle, and the more elastic the lens, the greater is the degree of accommodation which can be effected; for, under these circumstances, the suspensory ligament can be thoroughly relaxed, and the lens can become highly convex. Hence accommodation is strong, or has a great range, in children, extending from infinite distance to a point not more than three or four inches from the eye; for in them the ciliary muscle has great power, and the lens is very elastic. In advanced age, on the contrary, the muscle becomes feebler, and the lens is of firmer consistence and much less elastic. The suspensory ligament, consequently, does not undergo much relaxation, and the lens does not swell when the compressing influence of the anterior capsule is withdrawn. Hence the range of accommodation diminishes: distant objects, from which parallel, or approximately parallel, rays proceed, are still accurately focussed upon the retina; but any small object, to be clearly seen, must be held at a distance of 10 to 12 or 18 inches from the eye.

The influence of Dental lesions on the accommodation has been particularly investigated by Dr. Hermann Schmidt, of Berlin. This observer examined the eyes of ninety-two patients, who presented themselves at his clinic, suffering from some form of Dental disease—such, for example, as caries, periostitis, or neuralgia. Considerable pains were taken to determine the range of accommodation in both eyes, and to compare that on the sound with that on the unsound side; whilst reference was made to the tables of averages for each eye given by Donders. Amongst the ninety-two cases, Schmidt found there were only nineteen cases in which the range of accommodation was normal, or better than normal; in the remaining seventy-three cases the range was lowered, and in most instances considerably reduced.

In unilateral odontalgia, the range of accommodation was reduced on the same side in thirty cases. In fifty-one cases there was no difference in the diminution of the range of accommodation perceptible. In one case, the eye of the side opposite the unsound teeth was the weaker of the two. In nine cases the teeth were carious on both sides. It appeared further that the influence of Dental lesions on the accommodation was more frequent the younger the patient; the ages between ten and twenty being those in which the paresis was most marked. After thirty years of age the impairment of the power of accommodation was much less frequently observed.

The influence of sex was not noticeable.

In regard to the locality of the Dental lesion; in forty-one cases in which the upper maxilla was affected, paresis of accommodation was observed seventeen times. In thirty-nine cases in which the lower jaw was affected, the paresis was observed nineteen times. Disease of the teeth of the lower jaw, therefore, appeared to be somewhat more effective in producing failure of accommodation than that of the upper jaw. Disease of the incisors, and of the first, third and fifth back teeth, using the German mode of notation, appeared to be more frequently associated with the ocular disturbance than lesion of the canines, or of the second and fourth back teeth.

The nature of the Dental lesion appeared to be of little importance, great impairment of accommodation accompanying comparatively slight disease, whilst extensive disease of the teeth, accompanied by severe pain, was associated in some instances with only slight paresis of accommodation.

Dental lesions appeared to have no effect upon the sharpness of vision.

The impairment of the power of accommodation was only rarely noticed by the patients themselves, which perhaps might be in part attributable to the circumstance that in most cases, if the patients were suffering much pain, the ordinary avocations were suspended.

The explanation of this remarkable effect of Dental lesion is not quite clear. Two views may, it appears to me, be taken of it. We may regard it as of a reflex character, and as being analogous to that weakness or paralysis of certain muscles observed in some of the reflex paralyses of infancy, and which we may consider to be of the nature of an inhibitory influence, since they rapidly supervene and rapidly vanish; or we may regard it as a simple result of the generally lowered tone of the system, consequent on the depressing influence exerted by the Dental lesion. I need hardly dwell in this place, and before such an audience, on the extraordinarily powerful effect on the nervo-muscular and circulatory systems of prolonged toothache, or how the impairment of the digestive functions, the sleeplessness, and general feeling of malaise, lower the tone of the nervous system, and produce indisposition for all kinds of mental and bodily exertion. There can be little doubt that the sympathetic nervous system and the unstriated muscles participate in this depression; and we can easily understand how there is a corresponding diminution in the power of the ciliary muscle, and failure of accommodation.

Schmidt himself advances a very different explanation. He believes that in these cases a reflex stimulation of the vaso-motor nerves takes place, leading to increased intra-ocular pressure, and consequently to impairment of the power of accommodation. But when Schmidt's Paper was written the action of the vaso-motor nerves was less known than at present. And such reflex stimulation would seem calculated to lead to a diminution, rather than to an increase, of intra-ocular tension.

To enable us to speak quite positively upon the influence of carious or painful teeth upon the accommodation we require information that is very rarely attainable. We ought to know that the accommodation was thoroughly good before the teeth were affected, that the failure of accommodation occurred simultaneously, or soon after the Dental lesion; and, finally, that after the removal of teeth, recovery of the accommodation power takes place.

In the majority of cases we must rely upon the patient's word for the first of these factors of our judgment; and, in regard to the second, so many persons of both sexes, and all ages, are affected with Dental disease that if this be a *vera causa*, good accommodation would be the possession of only a favoured few: whilst lastly, even Schmidt, who paid particular attention to the subject, was only able to examine eight cases, out of nearly a hundred, after the extraction of the offending tooth or teeth. In five of these, however, distinct improvement was observed. The diminution in the power of accommodation was in each case characterised by the recession of the near point, whilst the far point remained unaltered. After extraction of the affected teeth the near point approximated to the eye.

Another class of cases in which a reflex influence appears to be exerted upon muscular tissue is that in which the muscular tissue of the iris is affected. This condition is termed *iridoplegia*, or *mydriasis*. In it the pupil is widely dilated and motionless, owing, as is generally believed, to paralysis of the sphincter pupillæ, which is supplied by the ciliary nerves containing branches of the third nerve; but it is possible that it may be due to contraction of the dilatator iridis, if such a muscle really exists, and this might be produced either by irritation of the branches of the sympathetic or of the fifth pair, which Bilogh believes supply it.*

It is remarkable and suggestive of its mode of origin that mydriasis rarely if ever occurs simultaneously on both sides, and in many cases that I have seen in past years I have scarcely ever been able to trace the ætiology, though I must admit that I have not paid special attention to the teeth. It is instructive to find that in one case recorded by Desmarres, a cure was effected by the extraction of a carious molar, and in future I shall certainly, in any case of the kind that may present itself, make a careful examination of the teeth.

In the cases that have fallen under my care the dilatation of the pupil has been permanent, which points rather to some organic lesion, such as might be produced by neuritis, than to any inhibitory influence.

One case, and so far as I know one case only, of *exophthalmia* has been placed on record. It is contained in a recent number of the "Recueil d'Ophthalmologie" of Galezowski, 1882, p. 441, and is reported by Weinberg. The chief facts of the case are that a widow presented herself in the out-patient department with an exophthalmia, accompanied by severe pain of the right eye. She had suffered for thirty-five years from epileptic vertigo and cramp of the stomach. In the month of March of last year she had an attack of phlebitis of the left femoral vein, and on examination she had varices in this leg, and some œdema of the left leg. For five weeks previously she had experienced noises in the right ear, with fronto-temporal cephalagia of the same side and pricking sensations of the eye, which lost its normal aspect, and she had intermittent sleeplessness. The pricking sensations gave place to lancinating pain, the eye reddened, and the bulbar conjunctiva was strongly injected. For four days previous to her appearance the vision had become hazy.

On examination the tension was found to be + 1, and there was exophthalmia of the right eye. The cornea was hazy; the palpebral and bulbar conjunctiva were much injected; the movements of the eye outwards and inwards were insufficient. Ophthalmoscopic examination showed floating particles in the vitreous, and as she was *myopic*, a crescent; the peripheric retinal veins were injected. The whole retina was redder than natural; near the macula were several hæmorrhagic spots. The heart, arteries, lungs, and the urine were normal. She could read No. 1 at 3 inches distance. Two leeches were ordered to the right temple; alternating instillations of atropine and eserine were ordered, but the former gave pain and was discontinued.

Ten days later, severe periorbital pain being experienced, with acute chemosis, the teeth were examined and two carious teeth and a a stump were found and promptly extracted. The results were remarkable. In the course of three days the patient was greatly improved in health, the chemosis had disappeared, as well as the injection of the conjunctiva, and above all the exophthalmia.

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* Wecker, i., 407.

In such a case as this we might attribute the relaxation of the vessels spoken of as conjunctivitis to paralysis of the vaso-motor system, and consequent passive dilatation of the conjunctival capillaries; whilst the protrusion of the globe may have been due to relaxation and loss of tone of Turner's periorbital unstriated muscle and of the several recti muscles, as well as to relaxation of the vascular and lymphatic systems behind the globe—all conditions that are explicable on an inhibitory influence being exerted by the damaged tooth.

That *strabismus* may be induced by dentition, and especially by difficult dentition, is, I think, generally admitted. Travers, as long ago as 1824, wrote: "Strabismus is also a symptom of irritation arising from difficult dentition." Many cases of strabismus come on quite suddenly, sometimes without the occurrence of any fit, but oftentimes immediately after a fit, during the first year of life, and therefore when the muscular exertion of the eye, requisite to be made to effect accommodation can have had nothing to do with it; for few children look intently at near objects, when alone the accommodation is brought into play, during the first few months of their existence. Yet the opinion that dentition is a cause of strabismus seems to rest on general consensus of opinion only, rather than upon any special well authenticated cases. And the frequency with which it is referred to in recent books is much less than was formerly customary; in fact, in some of the more recent treatises in Germany and France it is not even mentioned. This is attributable to the important generalisation of the ætiology of strabismus made by Donders, that in by far the greater number of cases it is due to hypermetropia.

(*To be concluded.*)

## NATIONAL DENTAL HOSPITAL.

### ANNUAL DINNER.

THE Annual Dinner of the Past and Present Students of the National Dental College was held at the Holborn Restaurant on Tuesday evening, Nov. 27th, the Chair being occupied by J. SMITH TURNER, Esq.

After the usual loyal toasts had been given by the CHAIRMAN and drunk with great enthusiasm,

Mr. CHRISTOPHER HEATH rose to propose the toast of "The Dental Societies." After referring to the three great Dental Societies, namely, the Odontological Society, Odonto-Chirurgical Society, and the British Dental Association, he said they must not forget the Students' Societies, of which, no doubt, many of their company were members, and which were undoubtedly the most important of all the Societies. Not only were they the most important but also the most useful, inasmuch as they were of the greatest service to those starting in the Profession, and of the utmost value in polishing the ideas of those who would in course of time pass on to the Odontological and Odonto-Chirurgical Societies. Very few words of his were necessary to commend the toast to their notice, and in proposing it he would couple with it the name of Dr. Walker, President of the Odontological Society.

Dr. Walker, in rising to respond, and also to propose the toast of "The Staff of the National Dental Hospital and College," said he quite agreed with his old friend Mr. Heath that the Students' Societies were of great importance. The Odontological Society, he was sorry to say, consisted principally of the older men of the Profession. Only that day was he looking down the list of names, and he found that the majority of members were elected in the earlier years of the Society's existence, and he looked in vain for the 469 L.D.S's of England and Scotland. He would therefore ask those young men before him, why they should not join the Odontological Society, and associate with men like Tomes, Parkinson, and Turner. He trusted they would turn over a new leaf and join the Society in the new year. He could assure them of a hearty reception, as the President-elect for 1884 was a man who would welcome the younger members in the heartiest manner possible. He thought to have a large harvest of new members for 1883 and 1884.

The students of the present day are being educated, coached and tutored so fully, that they should possess sound scientific Dental knowledge. Compare the present with the times when he commenced Dentistry, when to see into another man's surgery was almost like entering a second life, so secret was all Dental knowledge kept. But what was the condition of things now? Facilities for gaining knowledge were everywhere apparent, and they were continually invited to attend clinics; yet the response was a shrugging up of their shoulders and turning away in another direction. From the advantages placed before them at the present time, the students certainly ought to be equal to Dental Surgeons of any Nationality. He was present at a meeting of Dentists in Cologne, and in the society of some American gentlemen, three or four of whom had said that Dentistry in this country was so largely improving, that the Americans must be stimulated to fresh exertions, or the race would lie with the English. So far the Odontological Society had done its part, and it now rested with those present to follow on and make the Odontological, the Odonto-Chirurgical, the British Dental Association, and their own Societies much more thorough than they had been in the past. (Cheers.)

There was another little matter he had to dwell upon before sitting down, and that was, Why were not the duties of the Dental Surgeons of the General Hospitals more efficient than they were? There appeared in one of their journals a long article on the subject which he had been privately informed was written with a special object; but the reason that no improvement was made in the Dental Departments at the General Hospitals was purely one of pounds, shillings, and pence. He had been a Dental Surgeon at a General Hospital for years, and had endeavoured to move the Managing Board to improve the Dental Department. He had carried his resolution through two different stages of their voting system, but lost it by two votes at the last stage. Their Dean (Mr. Gaddes), who was a personal friend of his, had stimulated him to work for his object at the Westminster Hospital, and that stimulus had been the means of his renewing his efforts and offering to conduct the department at a minimum cost to the general funds.

With regard to the Staff it was scarcely necessary for him to commend to them that toast, but he would just allude to the patience that those gentlemen exhibited not only during the season of work, but also when the students were away taking their summer holidays. The Staff were still performing their duties at the Hospital whilst they as students were in the country gardening, or climbing the hills, throwing the net or fly on the trout; and, therefore, if he did nothing else, one thing he must do, and that was to impress upon them that there were duties for them to perform at the Hospital during vacation as well as during session. Their Staff was thoroughly deserving of their most hearty support, and it was with the greatest pleasure he proposed "The Staff of the National Dental Hospital and College, associating with it the name of Mr. Harry Rose." (Cheers.)

Mr. Harry Rose, in rising to respond, said, he would endeavour briefly to give them some idea of the changes which had taken place in their Institution during the time he had been associated with it. About thirteen years ago, when he first became connected with their Hospital, the whole of the duties performed were done during the morning, and he believed he was the first Assistant-Surgeon elected on the Staff. Many of that Staff had gone away from them to other parts, and some had passed away from their earthly home; but he felt sure those gentlemen might be regarded as the back bone of their Institution which had grown from that early condition into what they saw it at the present time as a recognised School for the preparation of students for their Dental diploma. (Cheers.) He had seen its active forces more than doubled, and had also witnessed a very large increase in the attendance of patients who sought their aid, and which increase could only be put down to the energy of the Staff, and the excellent work done by the students. (Cheers.) He felt sure, as regards their Consulting Staff, no words of his were necessary to commend those gentlemen, considering their names had become household words. (Cheers.)

Mr. Oakley Coles next rose to propose the toast of the "Medical and Dental Schools." He said no eloquence of his would be necessary to commend the toast of the "Medical and Dental Schools" to their sympathy, standing as he did in the presence of so many distinguished guests who were the representatives of various Medical Schools, especially of those connected with Dental education, and he felt sure no words of his would be necessary to commend it to their warmest reception and cordial recognition. He was of opinion, and he thought he should be supported in that opinion by some of them present that evening, that the number of Medical Schools should be considerably diminished; and that Dental education should be conducted in London as near as possible in a united manner, the theoretical teaching being conducted, as far as possible, under one roof; but the more clinical schools the better. Of course there should be schools in large towns, but not several in one large place as at present existed in London. Personally he had been connected with both Dental Schools in London, in one as student and in the other as teacher, but not at the present time occupying an appointment at any of them he was in a position to give an unbiassed opinion, and which opinion was that the interests of both would be best promoted by the union of the teaching powers of these Institutions. Certainly, such a course was a matter for mature consideration. He had urged the question before, and he did it again as he believed the time would eventually come when that scheme would be realised. He was convinced that such would only be brought about by their pegging away, so that the object could be kept well in view, and he desired to place it before them now. In conclusion, he would associate in connexion with the toast of the Medical and Dental Schools the names of Mr. Andrew Clark and Mr. Felix Weiss.

Mr. ANDREW CLARK said : Dr. Walker, in his speech, had certainly made several suggestions which, in a debating Society, would give a great many points for discussion. With regard to the remarks made by Mr. Coles, he quite agreed with him as to the necessity of union between the different Schools, but at present he could scarcely see how such an aim could be brought about. It seemed to him that Dental Surgery should be considered as a part of General Surgery in the same way as ophthalmic, orthopædic, and other branches of Surgery were recognised ; and he could not see why students should not become Surgeons as well as Dental Surgeons. Every year seemed to mark a slight progress in the right direction, and whether it would ever be possible to have Dental Schools and General ones together at the Hospitals he could not say at present. For some years at the Middlesex they had had Dental Surgeons, which had not only been an improvement for the Dental Student, but also for the Medical Students. One little matter he would mention while he was speaking, which, otherwise, he should not have taken the trouble to refer to, and that was with reference to a correspondence which had been going on in one of the Dental Journals pointing out that Dental Students were looked down upon by the Medical Students as beneath them, and that that feeling was encouraged by the Staff of the Middlesex Hospital ; that statement he could assure them was not true, inasmuch as students were every day more and more looking upon Dentistry as part of Medical education. In conclusion he thanked them all on behalf of the Medical Schools of London for the kind way in which they had received their toast.

Mr. WEISS, in reply, said he thought that, if they were to look at the Dental life of the present day, they could only look at the past as the lesson it afforded them for the future, and if they were at the present day doing their duty as practitioners, and were instructing those to follow in the course they ought to go, then all he could say was that they had nothing to fear for the future. He thought that their Profession should feel more joyful and satisfied with its present condition than it had done at any time in its history. He was inclined to disagree with Dr. Walker when he said that after men had their diploma they did not join their Societies. He would admit there were some few, but, as a rule, more young men were now joining the Odontological Society than ever did, and he felt sure that the older members would be very much delighted at those meetings to be sitting down and their young ones standing up addressing them. (Cheers.)

The CHAIRMAN next rose and said it was his pleasant duty to propose what was undoubtedly the toast of the evening, namely, that of "The Past and Present Students." Their evening up to that time had been a very cheerful one—so interesting was it in its past and present associations. The term "student," used in the everyday sense, had an attraction which he could not find in the designations of other searchers after knowledge. The philosopher, whether speculative, experimental, or practical; the explorer, going out to sea in ships or suspended by a bag of gas in mid air, or in his solitary walks through the dark continents, might awaken his sympathy, but would never have the same interest to him as the youthful student, in whatever walk of life he might be pursuing his studies. At the commencement of his career a young man puts off his school mode of learning, and the restraints which necessarily belonged to school, and laying hold of Surgery, Jurisprudence, Theology, or Dentistry, makes up his mind to walk through life with his choice, and as in the early dawn of existence the heart commenced to beat, and had to beat until its work was done; so would this choice for ever after influence his life, whether he was faithful or unfaithful to his first love—whether he had wooed her with all the vigour and enthusiasm of youth—or whether he had sought her favours feebly and coldly, and finished up by indifferently turning away from her altogether—the importance of that first step could never cease to be felt. The student was also at that time of life in a state when he began to feel the need of self-reliance, and, above all, self-restraint. The capacity for work and pleasure during the student age being far greater in them at that period than at any other epoch in their lives, and, in addition to that high and pure happiness which followed a conscientious devotion to their studies, there was that keen susceptibility for pleasure and amusement drawn from trivial circumstances, which was so characteristic of that fresh and healthy mental activity so essential to the student's career, and which, he would add, was sometimes rather embarrassing to the teacher. He felt sure he could with safety appeal to those who were farthest from that happy time, whether they had had all things provided for them and for their education, or whether, like himself, they had had to provide both for themselves and education; that even in their dullest moments they had been able to extract more true amusement from the most ordinary incidents around them than they were able now to do from their most elaborate and refined methods of entertainment. Therefore, knowing and feeling thus, he always looked upon student life with intense interest and sympathy. (Cheers.) Addressing the present students he would tell them to take their pleasures wisely, and their work steadily, never so much of one as would imperil the other, and never enough of both to injure their health. Of course there were times when work became an imperative duty, and therefore a necessity; but amusement was a luxury when held in contrast with duty and labour, therefore, in some cases, pleasure should go to the rear, and duty to the front. There was a time when student life was supposed to be connected with debauchery; but he himself thoroughly believed that that time had passed away, and with all due regard to the older practitioners, he also believed that in that respect the present students were far in advance of them. (Cheers.) To the Past Students he would say, do not because you have your diplomas in your pockets turn your backs upon your Alma Mater, for that would be an act of utter selfishness, and no such act can be perpetrated without reacting upon and depraving the moral character of the perpetrator. Your duty is to think kindly of her, and to remember the benefits you have received under her care, to support her by coming to meetings such as this, and also by seeking to induce others to follow in your footsteps, and so partake of the advantages which you have enjoyed. He would also say, continue students still in the pursuit of knowledge, and from accomplished students they would develop into useful teachers. He was aware they could not all have the honour of teaching in an appointed school or college, but he trusted they would bear in mind that Dentists in this country were being steadily, but surely, welded into a compact mass of educated practitioners. Dentists were not now obliged to travel up to London to meet their professional brethren, but Associations were formed in the East, the West, and the North, and he hoped before long to have the South added to the list. The desire for union was entering into the soul of the Profession, and many were the meetings held for the interchange of thought and ideas. Sir Edwin Saunders never imagined 30 years ago the honours which were in store for him; and although few of them could look forward to such an honourable distinction as that gentleman had received, yet there were degrees of eminence amongst themselves to be attained. The opportunities for such were daily increasing: journals ready to receive whatever they could supply in the way of literary ability; there were the meetings which he had indicated to them, at which they might read papers, expound views, or relate cases, the studying and doing of which would bring them distinction in their Profession. With all respect he would say he felt convinced that if Sir Edwin Saunders had not gained distinction amongst his professional brethren he would not have received that high social distinction which he was at present possessing. Therefore, he would ask all those gentlemen present to cultivate by study that familiarity with the principles and practice of their Profession which would enable them to take advantage of the occasions put forward in which they could acquit themselves with credit and with advantage to their hearers. (Cheers.) In conclusion, Mr. Turner said, they no doubt thought his remarks had been very dry, but it was necessary that they should have something dry to make them drink to the toast with enthusiasm and he would associate with the toast, on behalf of the Past Students the name of Mr. G. Hockley, and on behalf of the Present ones the name of Mr. T. Wright. (Cheers.)

Mr. G. HOCKLEY, in rising to respond, said he felt himself to be a very poor representative of the Past Students, having done nothing that he could remember to advance the cause of Dentistry; but one thing he sincerely hoped, and that was, that his fellow Past Students in the Profession would ever have at heart the welfare of their old Hospital. It was a great pleasure to meet, as they were doing that evening, and see so many old faces, but there was a mingling of regret at the loss of so many, well remembered, who had either passed away or had "with strangers made their home." In conclusion, he sincerely thanked Mr. Turner on behalf of the Past Students, for the manner in which he had proposed the toast, and the gentlemen present for the enthusiastic way in which they had drunk it; and, as many of their Past Students had done well, he hoped the present ones were doing the utmost they could, so that the future might be better than the past. (Cheers.)

Mr. F. WRIGHT replied on behalf of the Present Students, and remarked that it afforded him the greatest possible pleasure on behalf of his fellow-students to express to the Dean and Officers their most sincere and hearty thanks for the kindness shown by them in so thoroughly teaching them the details of their Profession, and he was sure they owed a great deal to the Lecturers of their Hospital, who, after the toils of the day, had the difficult task of knocking a little knowledge into their heads at the lectures to which they devote so much of their valuable time. He trusted that those gentlemen would in a slight measure have their efforts rewarded by their pupils succeeding as Dental Students. He strongly felt he should be usurping his position that evening if he did not, on behalf of his fellow-students, thank their Dean (Mr. Gaddes) for his unvarying kindness, and ever readiness to help and forward the interests of any of them. He was quite sure they all owed to that gentleman a deep sense of gratitude, which would be impossible for any of them to repay. (Cheers.) Mr. Wright, in conclusion, thanked the Chairman for the way in which he had given the toast of the Past and Present Students, and associated his name with it, and the gentlemen present, for the cordial manner in which they had received it.

Mr. GADDES, in proposing the toast of "The Visitors," remarked that the presence of visitors made them feel they were not alone in the world, and that the meeting of so many friends that evening showed that they had some sympathisers with them in their work. When Englishmen met together at a festive board it was a most gratifying sight to see familiar faces among them, and he assured the Visitors present that their presence was thoroughly appreciated by them all. Very few words were necessary to commend the toast to their notice, and especially when he mentioned the well-known name in the Profession he was about to couple with that toast—a gentleman who was more highly esteemed than known, and that not only for his own Professional virtues, but, indeed, for the good works of his family and of his father before him—that name being Mr. James Parkinson. (Cheers.) With such a name coupled with the toast there was no reason for him to detain them with any more remarks, further than to again thank the Visitors for their kind presence that evening.

Mr. JAMES PARKINSON said, that more than thirty years ago he, in combination with a gentleman who was anxious to bring the Dental Profession together, had suggested that meetings such as the present would be desirable, and that the gathering together of the members of the Profession was commenced by a series of entertainments. From that time they had gone on until their meetings had arrived at their present state. He again thanked, on behalf of the Visitors, the authorities for their hospitality, and could not but say that, personally, it was very gratifying to meet so many past and present members of the Profession. (Cheers.)

Mr. RYMER, in rising to propose the toast of "The Chairman," said, he felt it to be a very great pleasure to propose the toast of their

Chairman, and it was a special pleasure to him as their Chairman was his old friend Mr. J. Smith Turner. (Cheers.) In that gentleman the members of the Profession had had one who had done so much for them as a body that it was almost impossible for him to describe. They were aware of his friend's geniality and noble conduct, a friend to whoever he may have come in contact; a man in whom the Profession might well feel proud. (Cheers.) Considerably over a quarter of a century he had had the good fortune to enjoy the friendship of their Chairman. Such as they saw him that evening, such he was before many of their younger guests were born; always possessed of the same honourable and upright qualities which they observed in him at the present time. The only fault he could find with their Chairman through life was that he had been too modest with regard to himself, always standing in the back ground, but fearlessly to the front when the honour of his Profession was to be maintained.

Mr. J. S. Turner said, although their evening's entertainment had almost come to a close, it was his duty to rise and respond to the congratulations of his friends that evening, and to the highest allusions made by his kind associate, Mr. Rymer. That kind friend of his was, in a large measure, the means of their Profession attaining the position it had done in being recognised and established by an Act of Parliament. (Cheers.) And he thought that if Mr. Rymer had occupied the Chair that evening, that gentleman would have been in his proper place; but as he (Mr. Turner) had been placed in the Chair, he had endeavoured, has he had always done for his Profession, to conduct the affairs of the evening to the best of his ability. He sincerely trusted that their younger members would endeavour to maintain the Profession and keep it up to the standard at which they saw it at the present time, and which had cost so many of their older friends so much work and labour. And he would earnestly entreat them to beware of evils which were always at hand, and which would lay hold of their Profession and put it back to its old condition—a condition which would necessitate the work of reformation being done over again. In the toasts of the evening they had heard of the Odontological and Odonto-Chirurgical Societies which he trusted would continue to exist and prosper in their research of scientific matter connected with their Profession, but they had also heard that evening of the British Dental Association, which had been formed not only for scientific enlightenment, but which also dealt with political matters connected with their Profession. That Association was largely spreading, and he urged all members of the Profession to join that Association, and if in any large centre there was no Branch, to use every means in their power to establish one there. (Cheers.) The Annual General Meeting would be held at Edinburgh next year, and he would recommend members of the Profession to spend their holidays at that beautiful place, and attend their Association Meeting. Mr. Turner, in conclusion, thanked them for the enthusiastic way in which they had drunk his health, which he trusted would be spared to him if he could be of any little service to their Profession in the future. (Cheers.)

## DENTAL HOSPITAL OF LONDON MEDICAL SCHOOL.

### ANNUAL DINNER.

The Annual Dinner of the Past and Present Students of the above Institution was held at St. James's Hall, on Tuesday evening, December 4th, Mr. Charles Tomes, F.R.S., in the Chair.

The usual loyal toasts having been duly honoured, the Chairman said, he had some little difficulty in proposing the next toast, viz., that of "The Past and Present Students," inasmuch as he believed he was the only Past student of the Hospital who had occupied the Chair, and it seemed to him very much like asking them to drink his own health. During the period he had been connected with the Hospital, first as a student of Dental Surgery, then as a Lecturer, there had been time for him to see his fellow students get into positions of influence in the country, and who, in the parts they resided, became acknowledged people of the place. One such gentleman he would name because he had not put himself into the prominence he ought to have done, the gentleman he referred to being Mr. Forsyth. (Cheers.) He did not think, in the toast he was proposing, that he could leave that gentleman in the position of obscurity which he had chosen, he having been the first student of the Hospital. They had amongst them that evening a very good representative to respond to the toast in the name of Mr. Smale, the Medical Tutor of the Hospital—(cheers)—who would represent the Past Students, and Mr. Baldwin would respond for the Present Students.

Mr. Smale said, all Past Students felt a pleasure in gathering together, and, in fact, in doing anything connected with their Hospital. Their present position and future prospects, he thought, were due entirely to the excellent teaching and honourable examples set by the Staff of the Hospital. From his experience of the recent students of the last three or four years, he (Mr. Smale) could only say they certainly promised to keep up the position of the Hospital, as Mr. Forsyth and others had always endeavoured to do. Mr. Smale heartily thanked the gentlemen present on behalf of the Past Students.

Mr. Baldwin, in responding, said he thanked the Staff for their untiring labours towards the students, and expressed on behalf of the present ones the satisfaction they all felt with regard to their Hospital. Indeed, they had not only a feeling of satisfaction, but also pride in the fact that their Hospital and School was far ahead of any in Europe. The senior students, he thought, should feel particularly grateful in having come under the notice of such eminent men as they had done. It had been with great regret they had received the news that Mr. Charles Tomes was giving up the lectureship he had so long held, and he felt sure that their thanks were due to that gentleman for his labours on their behalf, and for the display of ability of the first order in connection therewith. He felt he could not but thank Mr. Underwood for his kindness to them all, and to himself personally, ever since he had joined the Hospital. Before coming to London, he had heard him spoken of in the highest terms, and during his sojourn here he had found him to be one of the kindest men he had ever known—(cheers)—and the thanks of all the future students would be due to that gentleman for what he had recently done in getting the examining board reduced to the time for which candidates may be referred, namely, from six months to three months. Having referred to the munificence of Sir Edwin Saunders, Mr. Baldwin thanked the company.

Mr. **Ken Underwood** proposed the toast of "The Staff," and he observed that during the seven and a-half years it had been his pleasure to form part of the Staff of the Hospital, it had undergone great changes, and changes which were so great that he did not suppose any successor of his would see in so short a time. He referred to the institution of the Preliminary Examination, the appointment of an Assistant House-Surgeon, a Demonstrator, and a Tutor; and also to the fact that during his seven and a-half years official connection with the School, every individual member of the Staff, except two, had gone from them. While mentioning the Staff, he could not but notice their old friend Mr. Alfred Hill, who had been amongst them for a quarter of a century. (Cheers.) During that time Mr. Hill held a post at their Hospital, and he ventured to say no one had exceeded him in popularity, or had done more good than he had done. That old friend of theirs now claimed rest on account of his age, and it was, of course, a matter of great regret to them; but he had determined to make up a service of five-and-twenty years, and having accomplished it, they all recognised the great work done for them. He (Mr. Underwood) said they were heartily glad to welcome new members and new life, but at the same time they deeply regretted to see old members passing away from them. Therefore, in proposing the toast of "the Staff," he would associate with it the name of Mr. Alfred Hill.

Mr. **Hill**, in responding, said, he had been connected with the Hospital from its very foundation. The changes which had taken place since the commencement of their Hospital would make up quite a history in itself, and he felt he should have preferred some other name to have been associated with the toast than his. His connection with the Staff of the Hospital had reaped its reward by his having been connected at different times with men of their Profession who had stood highest in the estimation of their Professional brethren, and the students of the present time stood, as it were, perfect monuments to the credit to their older men, and the more they augmented its power for good the greater tribute would they pay to those who had laboured for the foundation, and the basis upon which it rested. He had had the pleasure of examining and judging their work as students of the Hospital, and if he had a thousand professional men before him, he felt he should be bound to say that he had not only been pleased with their work, but felt he could not but commend it. If they, as students, continued to work with their Staff, and listen to their Lecturers, they would not only get hold of the theory from so doing, but they, as Dental Surgeons, would have their fingers trained to act in obedience to their will; and the Staff had endeavoured to reduce all principles of practice with the object that they would, by concentrated attention and study, attain their object as students.

Mr. **Turner**, in rising to propose the toast of "The London School of Dental Surgery," said he was happy to say that the condition of things had vastly improved during the past five and twenty years. Dental Surgery was a specialty, and the object of Dental education in this country could not be carried out without a special School and

Hospital. That School had been successful, not only as a School, but also for the excellent manner in which it had turned out members of the Profession. They must not always regard its success from a pecuniary point of view, but it should be estimated by the character of students who come to the School, and by the character of practitioners that were turned out. While it was desirable that Dentists should be Surgeons also, yet a man might take various qualifications and yet not be a skilled Dental Surgeon. They went before the public as Dental Surgeons, and he thought they should be thoroughly proficient in their Profession before they thought of anything else. (Cheers.) In conclusion, Mr. Turner said, he could not but congratulate the School on the possession of such a gentleman as Mr. Underwood as their Lecturer in the place of his talented predecessor, Mr. C. S. Tomes. He therefore felt much pleasure in associating with the toast the name of Mr. Arthur Underwood.

Mr. Arthur Underwood, in responding, remarked that he thought himself a very unworthy successor of Mr. Chas. Tomes, but the work at the Hospital was very pleasant owing to the way in which the students did their work, and he trusted all their work would be thoroughly successful.

Mr. A. H. Woodhouse then presented to Mr. F. Ken Underwood, on his retiring from the Deanship, a testimonial consisting of a handsome carriage clock, a purse containing fifty sovereigns, and a list of contributors, 124 in number, written on vellum. The testimonial represented the Staff and the Students during his term of office—seven and a-half years. In the name of the Staff, and Past and Presents Students of the Dental Hospital of London, Mr. Woodhouse said, he had much pleasure in presenting the testimonial as a token of their regard; and they all wished Mr. Underwood success in the Profession he was about to enter.

Mr. Underwood, in reply, returned his heartfelt thanks for their splendid testimonial, and said he could not express what he felt for their kindness. What he had done for them had been a delight. He had always received the heartiest support from the Staff and from his friends the students. Never during his term of office had he at any time to regret that he held such a post, everything making him regard it as a pleasure; but for this token of their friendship, and for the splendid gift, he never deserved or expected. (Cheers.)

Mr. Parkinson proposed the toast of "The Chairman," and Mr. Tomes having replied, Mr. S. J. Hutchinson in proposing the toast of the "Visitors," said, he must mention one name, and that was the provider of their feast, Mr. David Hepburn. That gentleman had tended so largely to their comfort and entertainment that evening by providing the very excellent programme of music given them. Therefore, in proposing this very pleasurable toast, he would couple it with the name of Mr. Seward, who was an old student at University College, and with that of their friend Mr. David Hepburn, and he was quite sure all the Visitors had done the same, and he thought their best thanks were due to the gentlemen who had so kindly entertained them with songs, etc., that evening. And just one more remark, and that was, he congratulated them most cordially for the flourishing condition of their Profession in this country.

Mr. SEWARD, and Mr. DAVID HEPBURN having responded, the company separated.

## THE BRITISH DENTAL ASSOCIATION.

### MIDLAND BRANCH.

A MEETING of the Midland Branch of the British Dental Association was held at Birmingham on the 8th ult. During the earlier part of the day Demonstrations were given by Messrs. R. F. H. King, W. Helyar, Cook Parsons, and St. George Elliott.

A meeting for the reading and discussion of papers was held at 4 p.m. Mr. Roff King, president of the branch, in the Chair.

Mr. BENNETT MAY, F.R.C.S., read a paper on "Cancerous Diseases of the Tongue and Mouth;" Mr. J. Humphreys read notes of a case of fracture of the superior maxillæ through the alveolar process, with replantation of a lateral incisor; and Mr. Roberts read a paper on the question, "Is Tobacco Injurious to the Teeth?"

In the evening a dinner was held at the Grand Hotel, and that concluded a successful meeting.

## CORRESPONDENCE.

We do not hold ourselves responsible for the views expressed by Correspondents.

*To the Editor of the* DENTAL RECORD.

SIR,—After the sad death from nitrous oxide at the Dental Hospital, might it not be beneficial to the younger branches of the Profession if some of our learned brethren would be good enough to favour us with a few plain rules, or course of treatment, to be adopted in the event of a like accident occuring in the private practice of any of us.

Yours faithfully,
LEONARD FAGGE.

Dec. 6th, 1883.

### SPECIMENS OF DENTAL PATHOLOGY.

*To the Editor of the* DENTAL RECORD.

SIR,—Having handed in to the Curator of the Museum of the Royal College of Surgeons the specimens of Dental Pathology, kindly sent to me by members of the Profession, I now desire to express my warmest thanks to these for their contributions, and to you, Sir, also, for having published my appeal, which produced them.

I am happy to be able to report that the number of preparations so presented exceeded one hundred; also that a large proportion of them are of considerable interest and value, so that a very important addition has been made to this section of the College museum, and, therefore, it can be no longer said that Dental Pathology as there represented is a reproach to us.

I am also in hope, from what the Curator told me, that these specimens will appear in an appendix to the new catalogue now in course of publication.

I am, &c.,
ALFRED COLEMAN.

December 17th, 1883.

# Editorial.

## DENTAL SCHOOLS.

At one of the Annual Dental School Dinners recently held (see page 37), the proposition was again mentioned of amalgamating the two Metropolitan Dental Schools. With this, as with every question, there are the "pro's and con's," and certain aspects of the subject may now be alluded to.

Theoretically, the union of the two teaching bodies would make larger classes than at present, and produce an increase of funds that would permit the giving of greater emoluments to Lecturers, and, therefore, together with the augmented honour of holding one of those rare appointments, the best ability could be secured.

On the other hand, there are the considerations that a monopoly is better avoided. Also it is within experience that appointments have been made, of course with the best anticipations of success, but the results have been the reverse of satisfactory. An instance of this kind is known to several members of our Profession, and the unquestionable effects of it are now difficult to realise. Such a disaster having occurred once, perhaps it may not be considered unwise to preserve what is one of the safeguards, and possibly the strongest safeguard, against a repetition—namely, the existence of two schools in the chief centre of Dental Education.

If the teaching of a subject be imperfect in one school it would probably be compensated by increased endeavour in the other school; and thus the detrimental effect of defective teaching upon the Profession would be far less general and serious than would be the case if there were a recurrence similar to the instance just cited.

The accuracy of the generalisation cannot be denied that all the more important books relating to Dentistry which have been published in the United Kingdom during the past quarter of a century have been written by Teachers of the Profession. The writers of books being also teachers may be merely coincidence; but the ability to impart knowledge is a special gift, and of the qualities necessary for being the author of a well written book, and of those for a good teacher, there is much in common. In the great Profession of Medicine the experience of practical teaching has, in the large majority of instances, been antecedent to the publishing of a book. The induction from the foregoing gives rise to the thought that by aiding the development of the teaching qualities of those who possess them, the literature (an inter-professional standard of measurement) of the Profession will be indirectly advanced. Whatever will facilitate the accomplishment of those disederata ought to be regarded as of paramount importance.

The benefits to the Medical Profession accruing from the healthy rivalry of the eleven Metropolitan Schools of Medicine cannot be denied, but whether the best interests of medical education would not be advanced by there being a somewhat less number need not now engage attention. That very rivalry has done and is still doing good ; and the suggestion to suppress the analagous stimulus to successful teaching and efficiency which the two existing London Dental Schools maintain is likewise a question for consideration.

If there be those who think that even a still greater stimulus to Dental education would be desirable, a not unproductive scheme would be an Exhibition open to all students, from any school, within a limited period after taking the L.D.S. degree.

## GOSSIP.

By a series of elaborate investigations, it has been determined by Jessen that raw beef and mutton are digested most quickly, whilst half-boiled beef and raw veal require a longer period. Next follow thoroughly-boiled and half-roasted beef, raw pork, and sour milk. Fresh milk, skimmed milk, and goat's milk take a longer time still ; and it would appear that well-roasted meats and boiled milk require the longest period for their digestion.

Mr. Morton Smale has been appointed Dean of the Dental Hospital of London, *vice* Mr. F. Ken Underwood, M.R.C.S., L.D.S.Eng., resigned ; and Mr. Arthur Underwood has been appointed Lecturer on Dental Anatomy and Physiology at the same School, *vice* Mr. C. S. Tomes, F.R.S., resigned.

The President of the Odontological Society entertained at Dinner, at the Devonshire Club, on the 1st ult., the officers and council of the Society, together with other friends, and distinguished and representative men.

Professor Owen has resigned the office of Superintendent of the Natural History Department of the British Museum, which he has held with much distinction for more than a quarter of a century.

THE

DENTAL RECORD.

VOL. IV. FEBRUARY 1, 1884. No. 2.

# PRE-HISTORIC TEETH.

By W. D. MILLER, D.D.S.

WRITING to the Editor of the *Independent Practitioner*, Dr. Miller, of Berlin, says:—

Some days ago I received the October number of the *Independent Practitioner*, containing your communication entitled: "An examination of the condition of the teeth of certain pre-historic American races." I need not say that I was very much interested in the facts therein brought to light, more particularly because it is a subject to which I have myself given considerable attention. Not quite a year ago I examined carefully all the skulls contained in the anatomical museum of the University of Berlin, about nine hundred in number, and made a record for each case of the number of teeth present, the number of cavities of decay, their location and extent, the amount of tartar, evidences of alveolar abscess, pyorrhœa alveolaris, etc., etc. In this collection are to be found skulls from all parts of the earth and from all ages, and a study of them permits of only one conclusion, viz., wherever man is found, there caries of the teeth and its concomitant evils will be found also.

I would not say, nor do you say, that pre-historic races were, or that modern uncivilized races are, as much tormented with this disease as the modern civilized races. I should be inclined to think not; but that caries was present in its worst form, of that there can be no doubt.

There is *one* lesion of the teeth which we meet with in practice almost daily, that I have not found in my examinations,—in the whole anatomical museum there is not a single sure case of that form of erosion which is here called the "wedge-shaped defect." I have seen it somewhere stated that barbarous races also suffer from this evil; that may be so, but no such cases found their way into the Berlin Museum. There are several large collections here, which I hope to be able to examine as soon as time allows, and may then give you in proper form the results of my examination.

At present let me refer to a very few cases.

1. Skull from an old burial place of the Huns, near Kertsch; sixteen teeth in position. The right superior first molar, right inferior first molar, and right inferior second bicuspid, all contained compound approximal cavities; there were traces of caries on the grinding surface of all the molars.

2. Skull from same grave; eleven teeth in position; one compound cavity, one exposure of pulp, and all the left upper molars gone, and alveoli obliterated.

3. Skull dug out of the ground in Sicily, very old, exact date uncertain; six teeth in position, all containing compound cavities on the grinding surface.

4. Mummy; thirty-two teeth; two simple and two compound buccal cavities, and one leading to exposure of pulp; right superior second molar and left superior first bicuspid complete ruins.

5. Ancient skull from a grave near Cairo; seventeen teeth. Upper molars all lost during life, except the left first, which was decayed to the margin of the gum. The left superior second bicuspid was in the same condition, both extensively abscessed, the whole external alveolar wall being gone completely, exposing the roots of both teeth.

6. Skull of a child from ancient Peru; one of the first molars a complete ruin; others had compound cavities on the grinding surface. Three of the temporary molars contained compound approximal cavities, and one was abscessed.

7. Skull of a Guarani (Indian race in Paraguay); thirty-two teeth. This denture would almost rival anything that could be shown to-day in Berlin or New York. There were no less than twenty-three large cavities, and three teeth decayed to the gum.

Of course the above are some of the worst cases, and there were all gradations from those named down to perfect dentures. There were also a number of cases where the teeth had all been lost during life, also abundant evidences of pyorrhœa alveolaris, and large accumulations of tartar. By the way, I did not fail in any case examined with reference to this point to find the familiar micro-organisms in the tartar after decalcification.

One denture, that of a Javanese, presented an appearance as "natural as life"; the left superior first bicuspid stood inside of the arch, forming an equilateral triangle with the cuspid and second bicuspid; all three teeth were extensively decayed on the surface looking towards the centre of the triangle.

In looking over the tabulated results obtained from the examination of these nine hundred specimens, I am able to draw no other conclusion than this: whatever deleterious effects the vices of civilization may have had upon the structure of the teeth, however much their power to resist the agents of decay may thereby have been reduced, the origin of the disease *caries dentium* itself, must be sought for at a time and place where neither modern nor civilizing influences had any existence.

## ON THE RELATIONS BETWEEN DENTAL LESIONS AND DISEASES OF THE EYE.

By Henry Power, M.B.Lond., F.R.C.S.,

*A Paper read before the Odontological Society.*

*Ophthalmic Surgeon at Bartholomew's Hospital, and Surgeon to the Royal Westminster Ophthalmic Hospital, &c.*

(*Continued from page* 35.)

The time at my disposal will not permit me to enter into any details in regard to the mode in which hypermetropia, or long-sightedness, leads to strabismus, but it will be enough to say that the hypermetropic eye is a flattened eye, that in accommodation for near objects great convergence of the eyes is required, and that a powerful and sustained nervous impulse is required in order that a near object should be fixed by both eyes, and that, owing to defective association between the effort for accommodation and that for convergence, convergent squint is frequently induced.

Other striated muscles that have been noticed as being occasionally affected in a reflex manner by disease of the teeth have been the levator palpebræ and the orbicularis palpebrarum; the former supplied by the third nerve, the latter by the seventh ; the paralysis or paresis of the former leading to more or less expressed *ptosis*, the latter to *lagophthalmos*. Ely* has recorded three good cases of such affections, in one of which there was paresis of the orbicularis palpebrarum, with irregular spasm of the ciliary muscle and monocular diplopia. In another there was paresis of the rectus internus and ciliary muscles, and in a third case partial paresis of the third nerve.

An affection that is not unfrequently observed is that which is termed *blepharospasm* or incessant winking of the lids, the movement being sometimes limited to the orbicularis palpebrarum, but at others extending to other muscles, such as the zygomatici and levatores anguli oris. This affection is well known to be associated with the error of refraction known as hypermetropia, when a powerful effort of contraction of the ciliary muscle is demanded. The impulse emanating from the brain, instead of being limited to the nerve supplying the ciliary muscle, has a strong tendency to radiate through other channels, and consequently to affect other muscles ; whilst in some instances the secreto-motory fibres of the fifth nerve are excited, and a copious discharge of tears results.

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* "New York Med. Record," Nov. 11, 1882.

But that similar conditions may be established in a reflex manner by some lesion of other nerves is well shown by a case that was reported many years ago, by Von Gräfe, to the Medical Society of Berlin. In this instance the blepharospasm ceased almost instantaneously when pressure was made upon a point situated below the alveolus of the third inferior molar tooth. At this point an incision was made down to the bone, but without modifying the blepharospasm in any appreciable degree. But having then established the fact that compression of the sub-orbital nerve and of the temporal branch of the malar materially diminished the spasm, section of these nerves was performed. The spasm immediately ceased, and the case was thought to be cured, but it re-appeared at the expiration of a fortnight. The section of the inferior dental nerve performed within the mouth ultimately caused the blepharospasm to cease entirely, and it had not re-appeared four weeks after. A case of convulsive tic, as he terms it, has also been recorded by Mitchell, which, supervening spontaneously, was propagated to the muscles of the neck and arms, and which entirely disappeared after the removal of several teeth.

As additional evidence of the influence of the stimulation of other and distant parts of the nervous system on the orbicularis may be mentioned the observations of Claude Bernard ; for this experimenter found that section of the sympathetic is followed by partial closure of the lids, and inversely if blepharospasm is induced in an animal by irritating the cornea with some caustic substance it may be removed by galvanising the sympathetic in the neck, when the lids open immediately, as by magic.

From the consideration of the influence of carious and painful teeth upon the striated and unstriated muscular tissue of the eye, I pass to that which they may be supposed to exert upon the conjunctiva, cornea, and sclerotic. And I would refer, in the first instance, to the affection named phlyctenular ophthalmia, which is very frequently associated with carious teeth, and which I believe to be often caused by them.

*Phlyctenular ophthalmia* consists in the appearance of one or more small vesicles, soon bursting and forming ulcers around the margin of the cornea, or on the surface of the cornea, or of the sclerotic. Sometimes only one is formed ; at others a succession appears. They sometimes produce little or no uneasiness ; at others they are attended with great intolerance of light, and abundant lachrymation. The child—for the disease occurs more frequently in children—keeps in the dark during the day, and only becomes lively at night.

The pathology of this disease is tolerably well known. It is believed to result from an inflammatory process, attended with the proliferation of nuclei along the sheaths of the nerve. The nuclei gradually advance towards the surface along the conjunctival, corneal, and sclerotic branches of the fifth nerve, and accumulating on the surface, form, with a little fluid, the contents of the vesicle, and when the vesicle bursts they gradually break down and disappear.

Now in cases of phlyctenular disease I have been accustomed to give minute directions in regard to diet, believing that this affection owed its origin to reflex irritation of the nerves of the eye, consequent upon some disturbance of the stomach and intestinal canal; and to the mothers of the numerous little patients suffering from this affection in our ophthalmic hospitals and departments of hospitals, I have been accustomed, after ordering a brisk purge and some quinine, to say, "Attend to its diet; no sweets, no pastry, no raw fruit. Give it bread and milk, finely cut-up meat and potatoes," and I am perfectly satisfied with the result of that treatment; but it has occurred to me that the view I have hitherto entertained of the ætiology of the disease may be erroneous, and that instead of the stomach, the teeth are perhaps the organs at fault. It is easy to comprehend that the mastication of raw apples, candied lemon and orange peel, jam tarts, and the like, lead to the impaction of acid and fermentable substances in the cracks and crannies of the teeth, especially if these are carious, and that remaining there for hours or days, if the due cleansing of the mouth after food is neglected, such particles may set up inflammatory troubles which may propagate themselves along the nerve and lead to what we term reflex phlyctenular inflammation of the eye.

No doubt there are many exceptions to the rule that carious teeth and phlyctenula of the conjunctiva are associated, but I have noticed that a large proportion of the children who have phlyctenular ophthalmia have also carious teeth. Surely this is very suggestive of the ætiology of the affection.

The occurrence of inflammation of the conjunctiva in such cases as the foregoing, as Weinberg remarks,* may be explained on two theories: on the one hand, when any organ is under the influence of some stimulus, this influence may modify the nerve filaments which terminate in this organ, and thus occasion phenomena of a reflex nature, either in the eye or elsewhere.

But it may also happen that the irritative process itself, whatever that may be, may propagate itself until it reaches the filaments which excite the neighbouring organ. It is evident that this can only happen when the filaments supplying the affected organs are derived from the same nerve, or when there are anastomoses between two nerves distributed to different organs. The two kinds of propagation, he observes, are well exemplified in the case of a carious tooth. In one instance there shall be well-marked conjunctivitis which resists ordinary treatment. The mouth is examined and a carious tooth is found, the very existence of which is unknown or forgotten by the patient, so slight has been the inconvenience he has experienced from its presence. The tooth is extracted, and the conjunctivitis forthwith and spontaneously disappears. This is a case of purely reflex action. But other cases are met with in which odontalgia is present, and in which the redness of the conjunctiva is accompanied with the small phlyctenular ulcers to which attention has just been drawn, with chemosis, and some impairment of vision. The pathogeny of this affection is more complex: part of the symptoms are here due to reflex irritation, but part also to an extension of the dental neuritis of the ophthalmic branch.

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* "Recueil d'Ophthalmologie," Nov., 1882.

In the course of nine months' out-patient practice, Weinberg believes he met with 188 cases of ocular disease dependent on dental lesion.

I have some reason for believing that serious lesions of the cornea may be primarily due to carious teeth, and I will venture to give you the heads of a case that I watched with much interest, but which ended disastrously so far as the eye was concerned.

J. F., a stout, ruddy Scotch girl, aged twenty-four, previously healthy and with good family history, suddenly, after exposure to cold, was seized with a sudden sharp pain on left side of face. The vision was then good on that side, but after a few days became dim. A small circumscribed collection of pus formed exactly in the centre of the cornea, and she was then brought to me. She was treated for a few days with quinine and hydrargyrum c. creata, and with atropine drops, no improvement resulting. I performed paracentesis corneæ at the side of the cornea, which the girl bore without flinching. Slight improvement followed. Local depletion, in the form of leeches and blisters, and general tonic remedies, strychnia and iron, were prescribed; but, the case dragging on, I again determined to tap the cornea, and this time passed the needle through the little abscess. The extreme indifference she showed to the puncture attracted my attention, and I then discovered that the cornea was anæsthetic, and that the sensation of the whole region supplied by the ophthalmic branch of the fifth was greatly impaired, though not quite lost. She was a servant, and as the case was likely to prove a troublesome one, she was taken into St. Bartholomew's Hospital under my care. The abscess had now become an ulcer; the cornea was generally hazy; there was much conjunctivitis, but no chemosis. She could distinguish the points of a pair of compasses at a distance of 1·5 c.m. over right brow, but only at a distance of 4·5 c.m. over left brow. Special attention was then paid to the teeth.

She stated that she had suffered much from toothache, and several carious teeth were found in both jaws, but especially on the left side. Four molars had been extracted at once. In the course of a month from this time the cornea had become clearer; some hypopyon previously present disappeared. The iris could be seen, and vision, which had been almost lost, recovered sufficiently to enable her to count figures, whilst the anæsthesia of the globe almost vanished. She left the hospital and took a cook's place, but she returned about seven months after saying that the eye had slowly deteriorated, perhaps from exposure to heat, and although there was now no loss of sensibility, the inflammation of the cornea and sclerotic, and the general discomfort from the condition of the globe, preventing her from doing her work, was so great that I determined to perform abscission, which was done nearly a year after the commencement of the disease, and the girl made a good recovery.

The lesion of the cornea in such a case as this may be referred to its anæsthetic condition; but the question arises, What caused the anæsthesia? and I can suggest no cause for it except that her teeth were seriously affected.

I now proceed to the consideration of the last class of cases into which I divide the ocular troubles caused by dental lesions, namely, those in which the reflex action is exerted upon the optic nerve and retina and inter-ocular structures.

And first in regard to the occurence of *amaurosis;* the most brilliant case on record is one that is now of somewhat ancient date, having been given by Sir William Lawrence, but which is so convincing that I venture to reproduce it here.

"Case 7. *Amaurosis caused by a carious tooth.*—F. P., thirty years of age, possessing a good constitution, and enjoying good health, with exception of pains in the head and limbs, which never lasted long, suddenly experienced in the autumn of 1825, a violent pain, shooting from the left temple to the eye and the side of the face: he ascribed it to cold. The pain lasted several days, then lessened, and reappeared from time to time without being sufficiently severe to induce the patient to seek medical aid. In about two months it suddenly increased in intensity, occupying the eye particularly, with a feeling as if it would pass out of the orbit. F. P. now discovered that he was blind with that eye, and applied to a neighbouring physician, whose treatment, continued for two months, did no good. The pain, however, was no longer continual: it assumed a somewhat periodical character, leaving the patient easy for some hours of the day. At the end of the following six months the pain increased, the cheek swelled, some spoonfuls of bloody matter were discharged by a spontaneous opening in the lower eyelid, after which the swelling subsided, and the pains nearly disappeared, although the blindness remained complete. The discharge was renewed from time to time during the following six months, and there was no great suffering. But in the autumn and winter (1826) the pain, particularly in the eye, became so violent that F. P. came to Wilna in the beginning of 1827, determined to have the organ extirpated, if no other remedy could be found. Professor Galezowski found the left eye totally insensible to light, with the pupil dilated, and no other visible alteration. The pain, not then so severe, consisted in violent occasional pricking or darting sensations in the left temple and parts round the eye. There was discharge from the lower eyelid. The first molar tooth of the left side was carious; it had not caused much uneasiness; and the toothache, when it existed, had not coincided with the pains in the temple and eye. The Professor determined on removing this tooth, and having done so, was surprised to see a small foreign body at the extremity of the fang. When drawn out, it proved to be a small splinter of wood, about three lines in length, which had traversed the centre of the tooth, and had probably been introduced in picking the teeth. A probe was passed from the socket into the antrum, from which a few drops of thin purulent fluid escaped. The pain ceased almost entirely, and on the same evening the eye began to be sensible to light. Vision gradually improved, so that, on the ninth day, the patient could see as well with the left eye as with the right, after a blindness of thirteen months; on the eleventh day he left Wilna to return to his family."

"I had," says Sir William, "the pleasure of becoming acquainted with Professor Galezowski when he visited England subsequent to this occurrence. He showed me the tooth and the splinter of wood, and he pointed out two circumstances in the case as particularly worthy of notice: first, that the entrance of the foreign body into the tooth had not been noticed at the time; and secondly, that a local irritation, hardly perceived at the seat of injury, should have affected the ramifications of the nervus trigeminus so violently as to produce amaurosis."

I met with no other case that is so complete as this; but Caffe* refers to a case in which blindness proceeded from a carious tooth of the upper jaw, and occurred whenever food collected in the cavity; and I have myself recently met with a case in which loss of vision occurred for a few minutes each time that, in clearing the cavity of a ious molar for plugging, the instrument caused pain.

Thomas Watson† refers to the repeated occurrence of blindness cured by the extraction of irregularly arranged teeth. Sudden blindness occurred in a boy eleven years of age. This was immediately cured on the removal of two permanent and four milk molars from a very closely compressed set of teeth; and Garretson* reports a case given by Salter. A women, twenty-four years of age, suffered from violent pain in the right upper first molar, which was accompanied with great swelling of the face; the globe was protruded, and vision was lost. A fistulous opening, from which pus flowed abundantly, existed at the outer as well as at the inner angle of the antrum. The cause of the suppuration in the antrum was the remains of the first upper molar; when this was removed a sound was passed into the antrum and a sequestrum was brought away. This proved to be the antral part of the floor of the orbit, the upper part of the malar bone, with the foramen infra-orbitale, and a broad, bony plate of the nasal wall of the antrum. The inflammatory symptoms immediately subsided, but there was no perception of light, and the pupil remained immovable. Five weeks subsequently the pupil began to respond to light, but there was no return of vision. Ophthalmoscopic examination of the eyes showed white atrophy of the optic disks. Gill concludes his essay with the statement that the phenomena which depend upon the optic nerve are attributable to a plastic inflammation, which affects the extra-cranial portion of the nerve. If the optic nerve is destroyed by this means, the blindness is persistent. The oculo-motor nerve suffers temporarily only; therefore also there is only temporary rigidity of the pupil. The protrusion of the bulb indicates that the sixth nerve is little or not at all affected. Mr. Gill is doubtful whether to regard the anæmia of the optic nerve as a cause or a consequence of the abolished function.

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* "Lancette Française," Aug. 22, 1839.

† "London Med. Gazette," fig. 5, 1841.

A case of sympathetic disease of the eyes in consequence of irritation of the dental nerves is given in the "Revue de Thérap. Med.-Chir.," Aug., 1871. The ocular and palpebral conjunctivæ of the eyes and eyelids were much congested; the vessels filled to the corneal border. Severe pain was experienced at night; there was considerable photophobia; the head was heavy and painful, tongue coated, appetite bad, pulse small and frequent. The affection lasted five months. Ten leeches were applied to the angle of the jaw, a collyrium of sulphate of zinc and a purgative prescribed, which led to some improvement. After the application of a blister to the back of the neck the pain recommenced. As the left molar was very carious it was removed, with the effect of immediately removing the symptoms, and in the course of a week the patient could use the eye again.

Gill, about the year 1873, read a Paper before the Missouri State

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* **Virchow Hirsch,** *loc. cit.*

Medical Association, on "Disturbances of vision resulting from neuralgia of the fifth pair of nerves consequent on Dental affections," which I have not been able to procure, but which is translated in the "Deutsches Vierteljahrschrift für Zahnsheitkunde," B. IV., p. 11, and is fully abstracted in the section on "Mund und Zahnkrankheiten," by Dr. Albrecht, in the "Jahresbericht für Gesammten Medicin" (V. Virchow, V. Hirsch) for 1873, B. H., p. 537. The following case is given in this Paper:—The patient was 33 years of age, and in the early part of the winter of 1870-71 began to experience neuralgic pains in the head and face, which lasted to the middle of the summer. The neuralgia extended over both sides of the head, and so far affected the visual power that the patient was no longer capable of reading. In the middle of the summer the neuralgia disappeared, and the vision became normal. In July, 1871, the neuralgia recurred, and coincidently there was diminution of visual power: the patient could only read Jäger No. 16. The pain experienced was especially severe at night. Examination with the opthalmoscope showed that there was sub-retintal effusion, and that the retinal arteries were ill-defined. There was a well-marked painful spot.

Examination of the apparently sound teeth showed that there was necrosis of the exposed left superior maxilla, but more careful examination demonstrated that the supposed necrosis was only a collection of tartar, which had surrounded the roots of the first and second molars. These two teeth were extracted, and a wide zone of ulceration was found around their roots, and to a smaller extent about the root of the second bicuspid, which, after the lapse of a few days, was also removed. The neuralgic symptoms immediately abated; the amblyopia, or dimness of vision, was reduced, and in the course of a week the patient could read again No. 6.

Mr. Hutchinson, in one of the early volumes of the Ophthalmic Hospital Reports, * has pointed out that certain cases of amaurosis bear a very close resemblance to infantile paralysis. "Without any warning whatever, without any cerebral symptoms, a patient loses the sight of one eye, and now and then, but very rarely, of both eyes." In some cases, he goes on to remark, there is a certain amount of improvement afterwards, but often the amaurosis becomes total and permanent. In some instances the optic disk becomes white and atrophic, but in others it retains almost normal vascular supply. Most of the cases which had come under his notice were women. In some, evidence of cardiac disease existed; in others there was none; and in most he found the *arteria centralis* of good size, so that the hypothesis of embolism seemed to him to have but little support. In several of the best marked cases that he had seen there was a history of neuralgia in the face for a long time before the occurrence of the amaurosis, the neuralgia being usually connected with toothache.

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* Vol. IV., p. 382.

Alexander of Aachen has reported * the following case of amaurosis resulting from Dental disease :—

A patient, æt. 26, had slight myopic astigmatism, which was, however, insufficient in amount to explain the greatly lowered visual power of the right eye. The right optic disk was somewhat hyperæmic. Abstraction of blood was ineffective, and in a subsequent examination the failure of vision was so great that the patient could only read Jäger No. 15. The patient then complained of severe pain in the upper right anterior molar tooth, and observed that it had been for some time periodically affected. The tooth was extracted, and vision almost immediately rose to two-thirds of its normal amount in the right eye, and became quite normal in the left eye.

In this, as well as in other reported cases, the eyes have often been slightly defective originally, and it stands to reason that any sympathetic influence is more likely to be felt by those in whom the functions of the eye are from any other cause impaired; or perhaps it might be said that sympathetic affections are more likely to be super-imposed upon defective than upon sound eyes. Thus a patient who has perfectly healthy eyes may long resist the depressing influence of toothache, but if his eyes are already congested or exhausted from uncorrected hypermetropia, it is easily intelligible that pain, by depressing the nervous energies, will cause the weakness of the ciliary muscle to be felt at an earlier period.

A similar case, in which an amaurotic condition of the eyes was improved by the removal of the stopping from a carious tooth, and was subsequently entirely cured by the removal of the tooth, has been reported by Dr. M. F. de Witt.† A strong and healthy man, æt. thirty-one, discovered that his right eye was blind. No pain, no photopsiæ had been experienced. He could distinguish light from darkness with the affected eye, but that was all. He was unable to give any account of the cause of the attack, but after a while he remembered that two months before losing his vision several teeth had been stopped. He had often felt pain near the first molar tooth of the right side, and he had often also experienced pain and tenderness of the gums, and abscesses had formed which he had himself opened with a penknife. On examination the tooth was found to be reduced to a shell, with a fistulous opening leading to the alveolus. Dr. de Witt, suspecting irritation of the fifth nerve proceeding from

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* "Monatsblätter f. Augenheilk," B. VI., p. 42, 1868.

† "Amer. Journ. Med. Sci., N. S.," CX., p. 382, April, 1868.

the teeth, removed the stopping in order to obtain a counter-opening, and to permit the fistulous orifice to close and to arrest the irritation. The immediate effect was that the gum ceased to be sore, and the visual power began to improve. After three weeks, when the sharpness of vision had greatly improved, the gums again began to be sore, and coincidently the acuteness of vision diminished. The affected tooth was extracted, and improvement then again took place, and vision became restored almost to its normal amount, though still not equal to that of the other. The fang of the tooth was filled with pus.

M. Nicaise* remarks that he knew that in certain cases the irritation of a Dental nerve may induce troubles, which indeed are often only transitory, of vision. These disturbances are explicable on the ground of the intimate relations which exist between the different branches of the fifth pair of nerves, the function of which is sensory, and which govern also the nutrition of the regions to which they are distributed. If the irritation of the fifth nerve is persistent, and if it ends by effecting some alteration in the nerves, it is possible that the disturbances of vision may become more serious and even permanent. Glaucoma, which is especially due to troubles of nutrition, may possibly have its point of departure in a lesion affecting the superior or inferior Dental nerves.

The relations of the teeth to glaucoma have been considered by several writers, but especially by Hermann Schmidt† and by Priestley Smith, whose remarks upon the subject are very sensible.‡

Glaucoma is a condition of the eye in which the humours of the eye are secreted in larger quantity than they can be taken up by the absorbents; the tension of the eye is therefore increased, it becomes hard and exquisitely tender, then extremely painful; the vessels of the retina are often seen to pulsate, and finally, after a period of suffering of variable duration, it quiets down, but the disk remains cupped, and vision is either altogether lost, or permanently and seriously impaired. I may say, in passing, that the cases of blindness which come before the ophthalmic surgeon from this cause are amongst the most melancholy that he sees—melancholy because he feels that in the majority of cases, if the surgeon in attendance, instead of being misled by the specious term "neuralgia," had recognised the disease and insisted on the performance of iridectomy during the first two or three days of pain, sight would have been perfectly preserved.

In regard to the pathology of this disease it is enough to state here that the increased hardness or tension of the eye is due in part to hyper-secretion, and in part to imperfect drainage of the aqueous fluid. How are these conditions produced? The imperfect drainage we know is produced by a narrowing of the depth of the anterior chamber, which interferes with the entrance of the aqueous humour into the canal of Schlemm and its passage outwards, and this is the result of the approximation of the iris to the cornea, either by enlargement of the lens, as Priestley Smith thinks, or by the formation of adhesions between the iris and cornea, as others believe.

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* "Gaz. Méd. de Paris," 1871, p. 150.

† "Archiv. f. Opthal.," XIV., i., 107.

‡ "Glaucoma: its Causes, &c.," 1879, p. 10, *et seq.*

But is there any evidence of hyper-secretion, and if there be, is the fifth nerve the exciting or even a predisposing cause?

It is certain that pain in the region of one or other of the branches of the fifth is a precursor of glaucoma in a large number of cases; and the presence or absence of ciliary neuralgia is mentioned in the report of almost every glaucomatous case.

But the most convincing evidence of the point in question is that which is derived from the experiments of Von Hippel and Grünhagen.* These observers found that whilst the normal tension of the contents of the eyeball is about one inch of mercury, if the aorta were compressed the tension rose to about three inches of mercury, and if now the fifth nerve were stimulated the pressure rose to as much as eight inches of mercury, and at the same time well-marked pulsations were observed. Even when the stimulation of the fifth was discontinued the tension was permanently increased, and the augmentation was perceptible even after death. It is not clear whether the trigeminus here acts as a true secreto-motory nerve in the same sense that stimulation of the chorda tympani causes increased activity of the salivary secretion, or whether it acts simply by causing dilatation of the blood vessels, and thus leading to an increased supply of blood to the organ.

The determination of this point, however, matters little from our present point of view. It is sufficient that irritation of the fifth causes marked increase in the tension of the eye, and it is easy to understand that in all cases where, from physical changes consequent on gouty or rheumatic inflammation of the iris, the eye is ripe for an outburst of glaucoma, the spark may be supplied by the irritation of a carious tooth.

It is but right to add, however, that Priestley Smith has made a series of tonometrical experiments at the Dental Hospital in a series of cases of toothache. The results he obtained were not very decisive, though he arrived at the conclusion that in young persons toothache rarely, if ever, causes a decided rise of tension. He estimated the tension in sixteen persons suffering at the moment or recently from severe pains in the teeth, and found on the whole little or no appreciable difference.

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* "Archiv. f. Ophthal.," XIV., iii., pp. 219-258.

The writing of this Paper has recalled to my memory various cases which were in the highest degree suggestive of the teeth being the starting-point of the trouble, and to which I regret extremely I did not direct a larger amount of care and attention at a period when it might have proved of service. To give one only:—

Mrs. S., æt. 32, a stout, ruddy-complexioned woman, suffered in 1878 and 1879 from coloured haloes round lights, and the general symptoms of threatening glaucoma. For these there was no apparent cause. She was healthy, in easy circumstances, and her habit of body and general manner of life were thoroughly normal and good. She, however, suffered severely from toothache. A particular tooth would begin to ache, without apparently decay of the crown. After enduring the pain for some time she would have the tooth extracted, and an abscess was always found to exist at the root. In March, 1880, after a fall which intensified all the symptoms, an iridectomy was performed on the left eye. The wound did not heal kindly, and a cystoid cicatrix was the result. The vision gradually deteriorated, and ultimately was entirely lost.

She now had two miscarriages, and some circumstances occurred in the family causing her much mental distress and depression of spirits, with frequent shedding of tears. I saw her first about eighteen months after the operation had been done.

The right eye was now the seat of trouble, but the vision was still very good, and with appropriate glasses (+ 1 D) could be rendered perfect. Three weeks previously she had awaked with violent pain, which lasted for three days. She saw bright lights, and the eye was hard, and the optic disk was white and cupped. She was told she had glaucoma, and that if the vision deteriorated she must submit to an operation. It did deteriorate rapidly, and I performed an iridectomy in the hope of saving vision, but the wound passed through the same stages as with the previous operation, and a cystoid cicatrix was formed with persistent high tension of the globe of the eye. I saw her only a few days ago with complete blindness of the left eye, and only perception of very bright light in the right eye. She again repeated to me the story of the teeth, and I could not but think that if a similar case appeared before me now, instead of trying iridectomy—which was here a signal failure, even when performed by two different operators, and which resisted eserine, and all the usual methods of reducing tension—I should at once have every tooth carefully and thoroughly inspected by an experienced Dental Surgeon. And I would ask whether such a case is not adapted for the removal and replantation of teeth, if these, after extraction, were found to be sound.

I fear, Mr. President and Gentlemen, that I have wearied you with cases, but I trust I may stand excused when I say that most of these cases are germane to the matter, and that my object has been in part to draw the attention of some amongst you who may not have given it a thought, to the close relationship which exists between the teeth and the eye, different as these organs are in their mode of development, their histological characters, and physiological uses, and in part to elicit from you some information that may prove of service to the ophthalmic surgeon, and may afford him some hints of the kinds of disease of the teeth which he is likely to overlook, and which it is important that he should recognise.

In conclusion, then, I think it may be laid down as a maxim to be generally observed that in all cases of threatening glaucoma, especially when this is associated with ciliary neurosis and obscure pains in the temples and maxillary orbital regions—in all cases of mydriasis, and probably of myosis, originating without apparent causes—in all cases of sudden paralysis of either of the orbital muscles, or of loss of sensation in the absence of cerebral symptoms—in all cases of phlyctenular disease of the conjunctiva—in all cases of ulcers of the cornea resisting ordinary treatment—in all cases of sudden failure of accommodation, especially in young children—and finally, in cases of exophthalmia, the condition of the teeth should at least be examined, and if faulty conditions present themselves these should be at once rectified, and then one at least of the possible causes of each of these diseases will be removed.

Schmidt: "Accommodations beschränkungen bei Zahnleiden; Gräfes Archiv.," XIV., i., p. 107.
Zetunder: "Klin. Monatsblätter," 1866, p. 269; 1868, p. 42.
Galezowski: "Journal d'Ophthalmologie," I., p. 606.
Keyser: "Dental Times," 1870.
" St. Louis Med. and Surg. Journ.," 1872, p. 302.
Blanc: "Journal des Connaiss. Med.-Chir.," 1871, No. 27.
Tavignot: *ibidem*, Ap. I.
"Gaz. Med.," 1871, No. 34, p. 369.
Chevalier: *id.*, 1871; p. 461.
Schmidt's "Jahrbücher," B. 129, p. 219; B. 131, p. 178; B. 133, p. 114; B. 138, p. 354.
"Hirsch Jahresbericht," 1873; B. II., p. 537.
Hutchinson: " Opthal. Hos. Rep.," IV., p. 381.
Wecker: "Ann. d'Oc.," T. LV., p. 130.
"Recueil d'Ophthalmologie," 1882, p. 441.
Auge: "De l'influence de la première dentition sur le développement de la Blepharo-conjonctivite; These," 1881. E. Baillière.
Priestley Smith: " Glaucoma: its Causes, &c.," 1879, p. 10, *et seq.*

RITOURET: "Annal. d'Ocul., LI., p. 226.
CAFFE: "Lancette Française," 1839; Aug. 22.
WATSON: "Lond. Med. Gaz.," 1841; fig 5.
"Revue de Thérapeut. Med.-Chir.," Aug., 1871.
DECASSIN: "Bull. Acad. Med. Belg.," T. XIII, 1853.
"Gaz. Méd. de Paris," T. XXVI., Ser. 3, 1871.
"Gaz. Méd. de Paris," 1871, p. 150: and Mem. presented to the Acad. de Médecine, 1869.
DEMORRES: "Traité," T. I., p. 376.

## DISCUSSION.

The PRESIDENT said he felt they were deeply indebted to Mr. Power for the evident pains he had taken in the preparation of the very valuable and interesting paper they had just been listening to. It was, indeed, a most important addition to the literature of the subject treated of, which did not appear to have hitherto received from surgeons as much attention as it deserved. He had himself met with one case which appeared to be very much in harmony with some of those related by Mr. Power. He had brought it under the notice of the Society about three years ago,* and would only now state the principal facts. A gentleman, who had been compelled to retire from business owing to complete loss of sight in the left eye and commencing failure in the right, came to consult him at the request of his medical attendant. On careful examination, the second left upper molar was found to be diseased; it was extracted, and the discharge of nearly an ounce of pus from the antrum followed, though there had been no bulging of the cheek or other sign of abscess in this situation. Within three months the sight of the left eye had become perfectly restored, that of the other having recovered itself within a still shorter period.

Mr. CHARTERS WHITE said he could not help remarking, while the paper was being read, the evident interest with which it was followed by the audience. It was certainly a subject of great interest to Dental Practitioners, since it was one on which there was very little information readily available, though all were occasionally liable to meet with cases similar to those quoted by Mr. Power. He had himself met with a case of the kind about four years ago. A young lady, of scrofulous diathesis, came to him with the pulp of the second left upper bicuspid much inflamed. He advised extraction, but the patient would not submit, so he dressed the tooth and told her to come again. He noticed at the same time that the cornea of the left eye was nebulous. When she returned there was acute inflammation of this eye, and the state of the tooth being still unsatisfactory, he again urged extraction, but without effect. The opacity of the left cornea increased, and after a time the right also became hazy. Then at last the patient consented to have the tooth removed. Marked improvement in the state of the eyes at once took place. The patient went to Eastbourne, where the keratitis gradually subsided, and she made a better recovery than might have been expected ; the sight of the left eye being, however, somewhat impaired.

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* See "Transactions," Vol. XII., *New Series*, p. 140; March, 1880.

Mr. W. A. HUNT said he rose to express the great regret and disappointment he felt that more time should not have been allowed for the reading and discussion of such a valuable paper. He saw before him a diagram to which Mr. Power had no doubt intended to refer, had he not been obliged, unfortunately, to shorten his paper. He saw there the various ganglia which connected motor and sympathetic branches with the sensory fifth,—the ophthalmic, Meckel's, the otic, and the submaxillary. He should have liked to hear the relations of these remarkable bodies explained by so good a physiologist as Mr. Power. With regard to the discussion also, he felt that it was quite impossible to do justice to such a paper in the very short time which was available for the purpose that evening.

Mr. COLEMAN said he quite agreed with what had been said as to the value of the paper, and should have been very glad if arrangements could have been made for prolonging the discussion. As the time was short, he would only state that, in his experience, conjunctivitis was the most common ophthalmic affection arising as the result of Dental irritation. He remembered, however, a case of amaurosis due to this cause, which had occurred in the practice of the Dental Hospital, and which was recorded in the Transactions of the Society about seven years ago. A woman applied who had broken off her left upper central, and one of the students kindly undertook to pivot it for her. He did so, and the patient at once lost the sight of the left eye. The tooth was removed, and within three days her sight was as good as ever.

Mr. T. W. NUNN, on being referred to by the President, said he had long been convinced that affections of distant parts were no unfrequently produced as the result of Dental irritation, though the cause was in most cases quite overlooked. He had brought this subject before an allied Society in a paper read six or seven years ago. He would only mention one instance, that of a gentleman who for a long time suffered from occasional intense pain in one knee. He obtained the best advice, but no disease could be detected in the joint, and no treatment seemed to have any effect upon the pain. One day, when a Dentist was examining his teeth, he touched one and the patient immediately felt the pain in his knee. The tooth was extracted, and the gentleman was thenceforth relieved of his pain.

The PRESIDENT said that, as the usual time for closing the meeting was already passed, he felt obliged, most unwillingly, to stop the discussion. The meeting then adjourned.

At the December meeting of the Society the PRESIDENT invited the members and visitors present to resume the discussion on Mr. Power's Paper.

Mr. MACNAMARA said he had come to the meeting that evening to learn rather than to speak; still he was glad of the opportunity of expressing his obligation to Mr. Power for the exceedingly interesting and instructive Paper which he had lately had the pleasure of reading. He believed it to be the most complete collection of facts bearing upon this important subject which had yet appeared in the English language. So far as he himself was concerned, the subject was almost a new one, yet he could clearly see that there was a great deal in it. It had, of course, long been known in a general way among surgeons that irritation of the fifth nerve might produce orbital lesions, as, for instance, that wounds of the supra-orbital nerve might cause blindness; but the evidence bearing upon the extent and variety of the changes which might thus be induced had never before, so far as he knew, been so clearly set forth. The influence of irritation of the fifth nerve upon the eye was well seen in the cases of severe hemicrania which were so frequently met with in India. The attacks would recur in some cases every two or three days; as the pain became severe there was greatly increased vascularity of the sclerotic and conjunctiva, and on examining the deeper structures of the eye the retina would be seen to be distinctly hyperæmic, the optic disc being scarlet, with, in some cases, evidence of retinal effusion. He had never known blindness to occur, but there was often considerable impairment of vision during the continuance of the attack; he was very sorry it had never occurred to him to test the power of accommodation.

Seeing, then, that the evidence of reflex action on the eye of other branches of the fifth nerve was so clear, it was not surprising that the irritation of so considerable a branch as the Dental should cause first hyperæmia, then effusion, and at last atrophy of the optic disc. But for all this he felt obliged to confess that he had not thought of this before; and it appeared to him a very great advantage of such societies as that which he was addressing, that by its instrumentality the attention of Dental and General Surgeons could be at once drawn to such a subject as this, with the result that much closer observation would be directed to the question of impairment of accommodation, or of general visual power, in connection with Dental lesions.

There was one class of eye cases which was specially obscure

These were cases in which atrophy of the optic nerve on one side occurred without any apparent cause—there was no evidence of any central lesion and no inflammation. Such cases were not very unfrequent, and they were very puzzling to Ophthalmic Surgeons. In future he should carefully examine the teeth; here was an evident possible cause, and he felt greatly indebted to Mr. Power for calling his attention to it. There were other affections of the eye, the etiology of which was somewhat obscure—as, for instance, glaucoma; but the cases of amaurosis to which he had referred had never been at all understood, and if it should be found possible to arrest their progress by extracting a few teeth it would be a most important discovery. He could not say that he had himself ever met with disease of the eye due to Dental irritation, but no doubt this had been owing to want of observation on his part. Now that attention had been specially directed to this connection he had no doubt that many more cases would be put on record.

The following communication from Mr. Spence Bate, F.R.S., of Plymouth, was read by the Secretary:—

> "I should like to state that a few days since I extracted some teeth with a view to relieving neuralgia in the eye. My diagnosis condemned the third upper molar on the same side as the affected eye, but I also removed the first upper molar on the same side, and an under molar on the opposite, for hygienic purposes.
>
> "The relief to the eye was early felt, and appears to be permanent."

Mr. S. C. Gibbons, of Brighton, mentioned the case of a young lady, aged twenty-one, who had consulted him in October. She had then been suffering from impaired vision, almost amounting to blindness, for about eighteen months. She had been for some time under the care of an oculist, who said she was suffering from amaurosis, and who had been treating her with setons and blisters; under this treatment some improvement had been effected, but her sight was still very defective. Upon examination of the mouth he found both centrals and the right lateral incisor very much decayed and dead. These were extracted, and also, at different times, the four upper bicuspids, which were necrosed, and the roots of the upper first molars; in the lower jaw the stumps of the first molars were extracted. Several of the roots were considerably enlarged by exostoses.

After the removal of these teeth the patient's health improved very much, and there was a most marvellous improvement in the sight, which was now almost as good as ever; the sight of the left eye was, however, still weak, though the right eye was at one time the worst.

Mr. W. A. Hunt (Yeovil), said he thought Mr. Power's cases might be conveniently divided into three classes. First, those in which failure of the power of accommodation was connected with diseased teeth; this had been noticed by many observers. Secondly, there were those in which local inflammation was excited, as conjunctivitis and phlyctenular ophthalmia; and, lastly, those in which general alteration of the nutrition of the eyeball resulted. These latter appeared to him the most difficult of explanation. Thus with regard to glaucoma Mr. Power had quoted the experiments of two German observers who had found that irritation of the fifth nerve would increase the tension of the eye from its normal amount (1 inch of mercury) to the equivalent of as much as 8 inches of mercury. He could not at all understand how it could be that in a healthy eye, with the ordinary drainage arrangements in full action, irritation of the fifth nerve could possibly have such an effect as that described.

He quite agreed with what Mr. Macnamara had said with reference to the importance of the subject, and the necessity for more careful observation. If Dental Practitioners would only give a little attention to these matters, they would soon amass an amount of information which would bear rich fruit for future ophthalmic surgeons. Unfortunately, however, Dentists did not often observe much beyond the limits of their own domain, and the reason of this was evident enough, viz., that their own work required such constant and close attention, and so completely engrossed all their faculties, that they had little opportunity for observing the condition of other organs.

Mr. J. S. TURNER said he thought members would congratulate themselves on the opportunity which had happily been afforded them of discussing, or hearing a discussion on, Mr. Power's Paper. It seemed to him, however, that the subject must, after all, be of interest chiefly to the ophthalmic surgeon. The Dentist might supplement his information by pointing out conditions which might escape his notice, and might assist him in the treatment of cases, but the elucidation of the phenomena which Mr. Power had described lay chiefly within the domains of the oculist. The investigation of the phenomena of reflex action was, no doubt, common ground to both, but the frequent occurrence in Mr. Power's Paper of explanation of such technical terms as hypermetropia, and of descriptions of the internal structures of the eye, showed that special knowledge and experience were required in dealing with such cases, and therefore they must be dealt with mainly by the oculist.

He had never to his knowledge met with any such cases as had been referred to by Mr. Power, nor in his own personal experience had he found that the extraction of carious teeth had been followed by improved vision; on the contrary, although he had lost a good many teeth, he found that his sight had rather deteriorated than otherwise. He could, however, confirm the observation of the French surgeon who had noted that odontalgia was often attended with lachrymation; he thought all Dentists were well acquainted with that fact. Mr.

Power's Paper was one to be read carefully by all Dental practitioners; he had himself been greatly interested by it. But as regards its practical application he thought the initiation must generally come from the ophthalmic surgeon, and that it was chiefly valuable to them as reminding them of a possible cause for eye diseases which had been very generally overlooked, and as suggesting to them the proper course to take in obstinate cases.

Mr. S. J. HUTCHINSON said he should be glad to have Mr. Power's opinion with reference to a case which he then had under observation. A lady came to him in October whose left upper eyelid was fixed wide open; this appeared to be due to a spasmodic contraction of the levator palpebræ. She could, however, by making an effort, almost close the eye. She said that in March last she was exposed to cold; this was followed by neuralgia of the left side of the face, and then this spasm of the eyelid came on, and had persisted ever since. On examining the teeth he found that both wisdom teeth on the left side were carious; the upper first molar on the same side was decayed, with exposed pulp, and the lower second molar was in the same condition. The only one of these teeth which had given her any inconvenience was the lower wisdom tooth, from which she had suffered some pain occasionally, but not very much. Thinking the spasm of the eyelid might be due to reflex irritation proceeding from the carious teeth, Mr. Hutchinson extracted all four of these, but without the slightest benefit to the patient. There was, apparently, nothing amiss with the other teeth except that the upper second molar had been filled with amalgam, but there were no signs of irritation of the pulp, and as the patient, perhaps with reason, was unwilling to submit to any further experiments, he had not ventured to insist on the removal of the filling. Mr. Power had not mentioned any similar case amongst those referred to in his Paper, and he (Mr. Hutchinson) should be glad if Mr. Power could suggest to him the probable cause of the spasm.

Mr. J. B. SUTTON remarked that the connection between disease of the eye and teeth was not such a new discovery as some of the speakers that evening seemed to suppose. It had been known a long time, and many Papers had been written on the subject. When he was attending the clinic of Professor Galezowski in Paris, in 1879, that eminent teacher lost no opportunity of impressing this connection on his pupils. He used occasionally to collect four or five cases of hypermetropia due to, or aggravated by, carious teeth, have the offending teeth extracted, and then demonstrate the consequent improvement in the sight.

Mr. A. COLEMAN referred to a patient who had applied to him at St. Bartholomew's Hospital only a few days previously, complaining that his teeth were tender, and that for the last two or three weeks his sight had become affected. On careful examination, however, he was found to be suffering from malignant disease of the antrum. He thought Dentists ought to pay greater attention to the condition of other organs than those with which they were immediately concerned. The time might come when Ophthalmic Surgeons might be able to throw some light upon Dental Science. It would be interesting, for instance, to ascertain, if possible, whether any connection could be made out between certain special diseases of the teeth and special diseases of the eye.

Mr. STOCKEN mentioned the case of a lady who had suffered for eight years from epileptiform neuralgia affecting the left side of the face, and attended with lachrymation of the left eye. He examined her teeth very carefully, but could find nothing amiss with them. He then prescribed a mixture containing gelseminum and aconite, which completely cured her. The origin of neuralgia was therefore obscure, but he was not at all satisfied that it was not a reflex effect of Dental irritation, although he had not been able to discover the exciting cause.

Mr. SAVORY said he had perused Mr. Power's admirable Paper with great interest. It gave support to a great and most important principle—one which was constantly at work in all parts of the body, both in health and disease—, viz., that intimate connection between distinct, and even distant, organs, which was commonly referred to under the name of *sympathy*. As examples of physiological sympathy he might mention the relation between the uterus and mammæ, and between the testicles and larynx. Whilst other examples of sympathy were seen in the pain in the knee constantly met with in cases of disease of the hip, and the pain at the end of the penis which was characteristic of stone in the bladder. Yet the importance of this great principle was often not recognised, and he hoped that this Paper would have the effect of calling renewed attention to it.

The effects produced upon distant parts by Dental irritation belonged to this category. That irritation of the Dental nerves might produce such effects had no doubt long been known, but few seemed to bear the fact in mind, and thus the real cause of the mischief was constantly overlooked. It was said that the late Dr. Baly first gained his reputation by curing a case of epilepsy, the cause of which—a splinter of wood impacted in a tooth—had escaped the observation of several well-known Medical Practitioners.

He was surprised to find so good a physiologist as Mr. Power speaking of sympathy and reflex action as though these were convertible terms. They really referred to two distinct things; in reflex action, the stimulus was communicated from a sensitive to a motor nerve, as in the case of strabismus due to Dental irritation. But inflammation of the cornea due to the same cause was an example of sympathy. The distinction was not unimportant, but after all the great thing to remember was that the cause of disease might be in one part of the body and the signs of it in another.

Mr. CHAS. TOMES said there was one fact which impressed him in reading Mr. Power's Paper, which had not yet been referred to in the course of the discussion. It had, he believed, generally been thought that remote nervous disturbance was more likely to occur where the living tooth pulp was irritated ; but amongst Mr. Power's cases most were cases of dead teeth, in which the irritation was external to the tooth. It must therefore have acted directly upon the nerve trunk, which lay in close proximity to the roots of the teeth, and not upon its terminal filaments. He thought this was rather an important point, and one to which attention should be called.

He had himself been at one time the subject of visual disturbance due to Dental irritation. It took the form of the very disagreeable sensation of looking through a film of running water. One eye only was affected; it was associated with supra-orbital headache, and he soon noticed that it occurred when some upper stumps on the same side became tender. As soon as he had clearly established this connection, he got rid of the stumps, and at once freed himself from the annoyance.

Mr. STORER BENNETT remarked that the subject of Mr. Power's Paper ought not to be altogether new to members of the Dental Profession, since reference to it was made in Mr. Salter's work, and by Mr. John Tomes in the first edition of his " Dental Surgery," in which several cases similar to those quoted by Mr. Power were brought forward. He wished to ask Mr. Power, with reference to the case of the patient who had glaucoma of both eyes, and who had several teeth extracted on account of alveolar abscess, if he could say whether the patient's eye symptoms were relieved either permanently or temporarily by these extractions ?

With regard to the experiments of Von Hippel and Grünhagen on the great increase of the tension of the eyeball produced by irritation of the fifth nerve, he thought it was very remarkable that this increase had not been noticed in some, at least, of the numerous cases of irritation of the fifth nerve which came under the notice of the Dental Profession, and he thought that if it did occur it could hardly fail to give rise to such symptoms as would certainly call attention to it.

The PRESIDENT having called upon the author of the Paper for his reply,

Mr. POWER said he would state at once that he had never laid claim to the slightest originality in connection with the subject of his

Paper. The facts therein mentioned had been known for the most part for years and years, as was plainly indicated by the dates of some of the cases. And had he had more time at his disposal, many more cases might have been collected.

It might, perhaps, be of interest if he were to point out the various ways in which diseased action might reach distant parts.

(1.) In the first place, distant organs might be affected by *direct continuity of disease*, as in Mr. Coleman's case of cancer.

(2.) Remote effects might be produced by *inhibition*. It was very difficult to explain the nature of this action, or even to say whether it was to be classed as reflex action or as sympathy.

(3.) There was the *trophic* or *vaso-motor influence;* irritation of one nerve would exert an inhibitory influence on the vaso-motor nerves supplied to the branches of an artery going to a distant part. Glaucoma might, in some instances, be explained in this way. Irritation of the fifth nerve exercised a paralysing influence on the ciliary branches of the third nerve; the small vessels supplied by some of these were also paralysed, and a much larger quantity of fluid was secreted than could be carried off by the usual channels, and thus increased tension within the eyeball resulted. Increased tension would not, however, by itself produce glaucoma—there must be other factors present; but if the eye was ripe for degenerative changes, this would induce the onset of the disease.

Another example of this trophic change was the haziness and ulceration of the cornea, which might be produced by irritation of the fifth nerve, and no doubt the case of cataract related by Mr. Sewill at the last meeting belonged to this class.

(4.) Remote effects might be produced by *extension of neuritis*. The neuritis runs up the nerve from the tooth, and is reflected back to the eye. Phlyctenular ophthalmia probably originated in this way, as microscopical investigation showed a continuous growth of nuclei along the course of the nerves.

(5.) Lastly, they might be due to *reflex irritation or sympathy*. Thus a child about two years old was brought to him suffering from squint. Not being satisfied as to the cause, he gave a brisk aperient, and the mother informed him that a large ball of worms came away; the squint at once disappeared. Sir Benjamin Brodie recorded the case of a woman who suffered for a long time from severe pain in one knee, which resisted all treatment; at last a tooth became painful and was extracted, and the pain immediately disappeared.

He agreed with Mr. Turner that the subject was rather one for the consideration of ophthalmic surgeons than for the members of that Society; still a knowledge of the facts he had called their attention to might be of use to them occasionally.

The condition described by Mr. Hutchinson was that known as Lagophthalmos, and was probably due to spasm of the levator palpebræ due to some irritation of the third nerve.

He agreed with Mr. Savory as to the value of the distinction he had pointed out. As to Mr. Bennett's question, he was sorry to say that he had not thought of the teeth as a possible cause of the case of double glaucoma which he had related, until it was too late. Should such a case again come under his notice, he should be very careful to get the teeth carefully examined and attended to.

He thanked them very heartily for the way in which they had received and discussed his Paper. Had he anticipated that it would have occasioned so much interest, he would have taken greater pains in its preparation.

The PRESIDENT then proposed a vote of thanks to Mr. Power for the valuable information he had given them, and this was carried with much applause.

## MEETING OF DENTAL PRACTITIONERS AT BIRMINGHAM.

A MEETING of Dental Practitioners was held at the Birmingham and Midland Institute, on Saturday, January 12th, to consider the desirability of forming a Dental Society for the Midlands; and there were present: — Messrs. Thos. Howkins, M.R.C.S.Eng., Chas. Sims, L.D.S.Eng., B. Neale, L.D.S.I., W. T. Elliott, L.D.S.Edin. & I., William J. Watson, L.D.S.Edin., F. R. Batchelor, L.D.S.I., Adams Parker, L.D.S.Eng., T. Dixon Miller, D.D.S., F. J. Sims, A. Clarke, F. Martin, A. W. Whitehead, F. E. Huxley, M.R.C.S., L.D.S.Edin. — all of Birmingham; J. S. Crapper, D.D.S., L.D.S.I., Hanley; S. F. Clarke, L.D.S.I., Burton; E. J. Gregory, D.D.S., L.D.S.I., Cheltenham; W. Brown, L.D.S.Glas., Stratford; James Williams, L.D.S.Eng., Walsall; F. J. Thorman, L.D.S.Eng., Leamington; F. H. Hudson, D.D.S., Leamington; T. M. Cottam, L.D.S.I., Oswestry; H. R. Fryer Brookes, L.D.S.I., Banbury; J. Humphreys, L.D.S.I., Bromsgrove; H. Owen, L.D.S.I., Wolverhampton; Rd. Owen, Wolverhampton; John W. Roberts, L.D.S.Glas., Dudley; Edwin Roberts, L.D.S.Glas., Westbromwich; James Hinds, Coventry; A. B. Verrier, L.D.S.I., Weymouth; G. Glover, L.D.S.I., Derby; O. A. Dennis, L.D.S.I., Nottingham; W. H. Key, L.D.S.Glas., Rhyl.

Mr. A. B. VERRIER gave a demonstration on the working of Continuous Gum, fully explaining his process and proving the efficiency of his useful and wonderful little furnace.

Dr. CRAPPER demonstrated treatment in Cases of Irregularity, and showed the results attained.

Mr. Thos. Howkins was unanimously voted to the Chair, and after the circular convening the meeting had been read, he said—From what they had just heard there were thirty gentlemen willing to join a Society promoted for the diffusion of scientific and practical knowledge pertaining to Dental Surgery, the encouragement of intercourse among members of the Profession, and the furtherance of the interests of Dental Surgery as a branch of Medicine. He had received a circular, and after considering the matter he had come to the conclusion that it was desirable to have a Society with its headquarters in Birmingham. He had been a member of the Odontological Society for some time, but found that it was too far off to be of much good to Provincial Practitioners as there was too much time lost in travelling, and consequently only a few, comparatively, could avail themselves of its advantages. He attended several meetings, but felt it useless to continue his membership, and finally gave it up. They required a Society which would afford opportunities for frequent meetings, and thus promote that social intercourse they appeared so much in need of. Such meetings would undoubtedly assist in causing an exchange of opinions, and possibly tend to the advancement of their Science, and thus make their services to the public more efficient.

There was no doubt that the encouragement of those friendly courtesies and meritorious efforts for advancement of professional knowledge, could not fail to produce a better feeling among those practising an honourable and useful Profession.

Mr. J. W. Roberts moved the following resolution:—"That, with the object of elevating the Dental Profession; of furthering the interests of Dentistry as a branch of General Surgery and Medicine; of encouraging intercourse amongst the members of the Profession; and promoting the diffusion of scientific and practical knowledge in all matters pertaining to Dental Surgery; this meeting approves and pledges itself to support a Dental Society having its ordinary place of meeting in Birmingham, and to be called 'The Society of Dentists.'" In supporting the resolution, he said that such a Society would prove very beneficial to the practitioners in the Midlands, considering how little those present were known to each other, notwithstanding the fact that they were working within so small an area. There were twenty-five L.D.S.'s, independent of many other worthy practitioners, within a radius of ten or fifteen miles of Birmingham; and when Mr. Watson suggested to him the formation of some Society, he felt confident that the proposal would certainly receive no opposition, if it did not receive the support and approval of every Dentist who wished to see his Profession in its proper position. The objects of the proposed Society were the diffusion of scientific and practical knowledge in all matters pertaining to Dental Surgery, and the promotion of social intercourse. At the same time the Society should not interfere in Dental politics. It was not proposed to found the Society in opposition to the British Dental Association, and he wished this to be distinctly understood, for instead of opposing that Association, he felt sure that the new Society would be a support to it. A local Society in harmony with the British Dental Association would be able to do much to further its interests, probably more as an independent Society than as a branch. At any rate most of those present were already members of the Association, and he hoped that all would ultimately become so. The advantages of a Society with a local habitation would be that they could meet frequently and enjoy the privilege of social intercourse; and it would give opportunity for the dissemination of those principles all professed to admire. There would be the periodical reading of Papers, and practical demonstrations; and there is no doubt such a Society would prove of incalculable benefit to the individual Practitioners. The Odontological Society had proved very beneficial, and all they required was the opportunity of meeting for similar purposes as the members of that Society, with a view of advancing the interests of their own particular Profession.

Mr. S. F. CLARKE, in seconding the resolution, said—One important point to consider was, What kind of field the proposed Society would have to work upon? He pointed out that there were about 4,000 names on the Dentists' Register, and out of that number only some 500 were members of the British Dental Association; so that there remained some 80 per cent. to work upon. Of course a great majority were probably ineligible for any such Society as was now proposed; still, there remained a large number that would be eligible and would willingly avail themselves of the advantages of a Society on the basis mentioned in the resolution. If they examined the map of Great Britain there would be found no place more central or more accessible than Birmingham, because the network of railways offered every facility for travellers from all parts. He ventured to say that there was no place in which Dentistry and Surgery were more closely allied than in Birmingham. There were two large general hospitals, besides others devoted to special diseases, also a flourishing Dental hospital, besides the excellent Medical and Scientific Colleges and Institutes forming sufficient attraction to bring people to Birmingham. By this Society they could arrange for monthly or bi-monthly meetings, according as was deemed desirable; but when a Society moved from place to place holding one meeting each year, it generally happened that a large proportion of the members did not attend because of the distance to travel. For these reasons he considered Birmingham a most suitable place in which to form a Society. (Hear). He would not limit it to the Dental Profession, but they should have power to elect any medical or scientific gentleman who had made himself known in his particular branch of study.

With regard to the basis of the Society he wished to see it established on a broad foundation, and all who upheld the dignity and status of the Profession should be welcomed by holding out to them the right hand of good fellowship.

To those that were apparently exorcised as to the Society clashing with any of the Societies in existence, he assured them that such was a mistaken idea, and that the pioneers of this proposed Society wished to avoid any rivalry or opposition to all Societies at present established.

To his mind, it did not matter how many Societies there were so long as they did good work and all lead in the same direction, viz., the advancement and upraising of the Profession generally. Even if there were two, three, or four Societies there were many who would join all if their meetings were held within an easy distance.

Mr. NEALE said he was glad to hear that the new Society was not in opposition to the British Dental Association, although he had doubts as to its success. If not affiliated with that Association, a local Society would not attract such a body of men as lately visited Birmingham at the recent meeting of the Midland Branch of the British Dental Association. (Question.)

Mr. CHAS. SIMS criticised the policy of calling the present meeting considering what was done at the (September) recent meeting of the Midland Branch of the British Dental Association. He claimed that the Branch would do all they required, and, in fact, had already made arrangements to do what was now proposed to be done by the formation of this new Society.

Mr. ADAMS PARKER said he was under the impression when he signed in favour of the Society, that it was intended to make it a branch of the British Dental Association.

Mr. WATSON said that the question of joining the British Dental Association was one which it was thought would be better discussed and decided when the Society was formed. He simply desired to place the matter before them for consideration, feeling sure they must decide that a local Branch of the British Dental Association or an independent Society, with its ordinary place of meeting in Birmingham, would best meet the requirements of the Practitioners in the district of which there were a sufficient number to form a strong and useful Society.

Dr. MILLER said there was a general wish on the part of Practitioners in the district to form a Society which should not only be non-political in character, but philosophical in its aim.

Mr. J. WILLIAMS said that he could not tell what the British Dental Association had done for them. Some three or four years ago Mr.

Sims asked him to become a member, to which he at once agreed, and after a time he received a form to get filled up by three members of that Association testifying as to his eligibility for membership; and, would they believe it? he did not know three gentlemen who were members, so that he could not become a member. He thought a local Society would best meet their requirements.

Mr. HUMPHREYS thought it best to form a Society which could receive the support of all the Dentists in the town.

Mr. HUXLEY, Mr. F. J. SIMS, and Mr. BATCHELOR opposed the formation of the Society, while it was supported by Mr. OWEN, Mr. HINDS, and others.

The CHAIRMAN then put the resolution to the vote and declared it even voting, there being 11 for each side; but as there was some confusion owing to holding up of both hands, it was decided to test the voting again with one hand only. The resolution was then lost, 11 votes for and 12 against; this difference being attributed to the action of a gentleman, said to be an assistant, who voted the second time but not first.

Mr. WATSON protested against the vote being accepted, as it was not expected that gentlemen would bring their assistants to vote, more especially as two or three gentlemen who were anxious to vote for the resolution had been compelled to leave in order to catch their trains in consequence of the protracted discussion.

Several supporters of the resolution said it did not matter about the result of the voting as they should at once proceed to form a Society.

Mr. WATSON moved that a hearty vote of thanks be given to Mr. Verrier for his very able and interesting demonstration, which had afforded much pleasure and instruction.

A vote of thanks being also awarded to Dr. Crapper and the Chairman, the proceedings terminated.

## THE VICTORIA DENTAL HOSPITAL, MANCHESTER.

A MEETING of gentlemen interested in this charitable Institution was held in the Mayor's Parlour of the Manchester Town Hall on the 22nd Jan., having for its object the view "of bringing it under public notice and of enlisting the support of the inhabitants of Manchester and the neighbourhood." There was a very large attendance. The Mayor of Salford presided, and amongst those present were the Bishop of Salford (Dr. Vaughan), Professor Gamgee, Dr. Lloyd Roberts, Dr. Hardie, Dr. Sinclair, the Rev. Dr. Burton, the Rev. S. Farrington, Dr. Hewitt, Dr. Cullingworth, Mr. Reuben Spencer, Mr. J. Broome, Dr. Samelson, Alderman Walmsley, Mr. F. E. Bumby (hon. sec.), etc.

The Mayor of Salford having opened the proceedings,

The Secretary read the notice convening the meeting, and also a report which had been prepared by the Provisional Committee. It stated that the object of the meeting was to bring the Victoria Dental Hospital, established for the relief of the suffering poor, and as a basis for Dental education, under the notice of the public of Manchester. So great was such an Institution needed that it might be a matter of surprise that it was not established years ago. It appeared that fully 10 years since the establishment of such a hospital was under the consideration of the leaders of the Profession, but by reason of the very general feeling that the hospital, in order fully to serve its proper ends, should be connected with the medical school of Owens College—at that time fully occupied with matters connected with the removal to the new college buildings—this question was allowed to remain for a season in abeyance. The movement for obtaining a university charter for Manchester seemed a reason for further delay, and after the granting of the Victoria University Charter the application for the power to grant degrees in medicine occupied the attention of the college authorities, and the friends of the hospital scheme considered it better to wait until it could be established on such a basis as to meet all required by the public and the Profession. Now that all those obstacles had disappeared, the movement had been revived, and had practically received the unanimous support of the Dental Profession. In the autumn of last year a private meeting of a large number of the leading Dentists of Manchester was held for the purpose of considering the advisability of establishing a Dental Hospital of such a character as to be at once a real service as a charity, and a basis for the education of Dental Students. The opinion of that meeting was unanimously in favour of the formation of a Dental Hospital, and a Provisional Committee of Dentists was appointed to consider the matter in detail, and to arrange all necessary preliminaries. The bye-laws were settled, and premises had been taken in Sydney Street on very advantageous terms, the rent being moderate, and the premises being in every way most suitable for the purposes of the Institution. With reference to the support the Committee had already received, in a pecuniary sense, they might state that it was by no means inconsiderable, although they had not endeavoured to do so much in this direction, considering it best to establish the Institution first, and not to bring the matter before the public or canvass actively for support until the establishment was practically on foot. They laid this statement before the meeting and the public generally with full confidence that the matter would receive that hearty support which an institution so urgently needed and so calculated to benefit the poor and suffering and assist the student in the practical knowledge of his profession, as the present, should receive from a community such as that of this city; and they trusted that the meeting would be able to express its satisfaction with the work already effected by the promoters, and give the Victoria Dental Hospital of Manchester the benefit of its favourable countenance and substantial support.

The BISHOP of SALFORD said that any association which had for its object the supplying of the wants of the poorer portion of a large community like this, and relieving their suffering, was one worthy of assistance, but he had been a little taken aback since he came into the room by having placed in his hand a document headed "The Manchester Dental Hospital." He did not know whether there was an institution called the "Manchester Dental Hospital," whether it fulfilled the functions it undertook in a faithful manner; but certainly it had never come under his notice, and he thought it might be desirable to know in what position they stood. (Applause.) That institution was actually on foot; it was not an old-established one —in fact it was only established in July, 1883, and, therefore, it had not a long-live examination to undergo. However, it was in existence, and the first point in the constitution of its general laws was very similar to the point in the resolution he was about to move. When he was asked to take part in the movement, to assist which they had met, he looked for the names of persons who would be a guarantee to him to place his name upon the paper, and he did find the names of a number of friends, eminent men in their profession, which he felt to be a complete guarantee to him that he should be doing the proper thing in joining their ranks. (Applause.) There was one point, however, which struck him, and that was that the proposed Victoria Dental Hospital was to be in direct communication with the Victoria University and Owens College. There might have been an excellent effort intended some years ago, and one which they would not like to see fall through, but what they had to say was this, that it did not appear to have been an institution founded for the purpose of being connected with Owens College, and, therefore, that which they proposed to establish would be an institution connected with the highest institution of modern science in this part of the country. If it had the close support of that College and University he presumed that scarcely anyone would doubt but that it was right to support those gentlemen who promoted such an institution, because it would be imperfect unless it had something like skilled Dental Surgery. That was the definite difference claimed, the *raison d'être* which he did not find in the programme of the Manchester Dental Hospital.

A VOICE: Read the last paragraph in the Paper.

The BISHOP read the paragraph as follows:—"The Manchester

Dental Hospital will provide gratuitous relief for the poor, and serve as a clinical school for those students who may wish to attend Owens College for the Dental Lectures." Continuing, the Bishop said that before committing himself irrevocably to a movement of this sort he should like to have the sense of the Professors connected with Owens College, for there was something that wanted clearing up. His lordship then moved the following resolutions:—First, "That a Dental Hospital of the character described to this meeting is urgently needed to meet the requirements of the poor and suffering inhabitants of this city and the surrounding district." Secondly, "That a Dental Hospital offering means for the practical instruction of students attending classes in Dentistry at the Owens College is much needed." Thirdly, "That the benevolent purposes and educational needs referred to in the previous resolutions will be met by the Victoria Dental Hospital of Manchester, and this meeting considers that the objects of the same are worthy of the support of the public, and pledges itself to further these objects and to support the hospital in every legitimate way." As the resolution stood nothing could be more intelligible to him, but the question was—was there anything in the way, and if it be in the way could it be removed, or could they amalgamate the two societies? (Applause.) He hardly thought that in Manchester there was room for two large institutions—(applause)—which might be opposed to each other. To him the proper thing would be to amalgamate. (Applause.)

Professor Gamgee, in seconding the resolution, said he wished to correct a misunderstanding. No hospital, as such, could be connected with the Victoria University. The support which they were about to give to the hospital about to be established must be given on general grounds. Six years ago the attention of Owens College was directed to the desirability of giving instruction to Medical Students, and he as the leader of that school drew up a report in which he expressed the opinion distinctly that there should be formal instruction given in Owens College. He pointed out that it could be done. He said that no system of Dental instruction could be established on a satisfactory basis unless they were certain that there was a place outside where students could be taught in such matters, and receive a sound medical training. If there was anything done to bring about a system of Dental instruction in Owens College, they must have the assurance that there would be proper means under which Medical Students could be taught by efficient doctors. He echoed the sentiments of the Bishop of Salford with regard to the scheme which had been brought before the citizens of Manchester, and which had also received the support of the heads of the Dental Profession. (Applause.) When he mentioned such names as Mr. Campion, Mr.

Shaw, Mr. Rogers, and others, who were supporting that movement, they would see at once that the practical teaching of Dentistry would be carried on in such a way that it would be supplemented by the instruction given in Owens College. He disclaimed any idea of partisanship in the matter, and if there could be any *modus vivendi* which would clear the way he should be pleased to see an amalgamation of the two societies. He confessed, he must say, that the early history of the Manchester Dental Hospital was not a history which commended itself to him or which would commend itself to any one who would investigate it. The names of the Consulting Physician and Consulting Surgeon had been placed on the list without their consent. (Cries of "Name.") He referred to Dr. Jones and Dr. Leech.

A gentleman in the room rose to a point of order. He denied Dr. Gamgee's assertion, and stated that the names of Drs. Jones and Leech had never been printed on the Paper.

Dr. GAMGEE : They were communicated to me.

Dr. PARSONS SHAW spoke in support of the resolution, and read a letter from Mr. H. Campion, in which that gentleman cordially approved of the object of the meeting.

Dr. HEWITT said that the promoters of the new hospital did not come forward with any problematical scheme. The hospital was now established, and they simply asked those present to support the scheme submitted.

The CHAIRMAN announced that an amendment had been sent up to him which he could not accept as an amendment, but it might be moved afterwards as a substantive motion. The amendment was to the effect that in order to give confidence to any economical administration of the Institution, the committee were requested to defer any appeal for subscriptions, and to appoint a meeting to confer with the committee of the Manchester Dental Hospital with the view of amalgamation.

Alderman WALMSLEY moved an amendment to the effect that the consideration of the subject brought before the meeting that day be referred to the committees of the two Dental Institutions which they knew were now in existence. He said that after what he had heard in that room and elsewhere he felt convinced that it would not be wise to force upon the public of Manchester two institutions which he must say were ill matured. With regard to the remarks of Dr. Gamgee he did not see in the printed list of names those names mentioned by the professor.

Professor GAMGEE, in explanation, said he made no reference to the printed list.

Dr. KINCH said he had no confidence in an institution which was formed before it was submitted to the public for approval and assistance. With regard to the Manchester Dental Hospital during the six months it had been at work they had performed 827 operations, which showed at all events that some work had been done. Some gentleman had said that there was need for two Dental Hospitals, but he should like to know in what town in England two such institutions existed. It would not be a pleasant sight to see two hospitals in rivalry, and it was enough to make one despair of philanthropic effort. He advocated amalgamation.

Dr. BURTON and others defended the Manchester Dental Hospital and pointed out that the new hospital would be in the very next street to the one now at work. Dr. Hardie moved the previous question, which was seconded by Dr. Ross. Considerable feeling was displayed by the supporters of the two institutions. After two hours and a quarter's discussion the Chairman announced that the provisional committee of the new hospital would meet the committee of the Manchester Dental Hospital, to confer with a view to amalgamation, a statement that was received with loud applause.

The customary votes of thanks having been accorded the proceedings terminated.

## ODONTOLOGICAL SOCIETY.

THE Ordinary Monthly Meeting of this Society was held on December the 3rd, Dr. WALKER, President, in the Chair.

Mr. A. WILSON and Mr. WHITE (Norwich) showed specimens of gemminate teeth.

Mr. WHITE also exhibited a model of the lower jaw of a young lady, aged 18, showing six fully erupted molars besides the wisdom teeth, which were just appearing. There were two lower bicuspids. The detention in the upper jaw was normal.

Mr. HENRI WEISS mentioned that he filled a cavity on the distal aspect of a right upper first bicuspid with gold, using the rubber dam. A week later, when the filling was finished off and polished, the patient only complained of slight tenderness of the gum. Three weeks afterwards she returned, having suffered great pain during the interval. On examination, the tooth next to the one which had been stopped (the second bicuspid) was found to be loose and tender. It was extracted, and there was then discovered a detached ring of rubber dam, which had worked its way up the roots just as an elastic band would. He had punched the hole in the rubber with an ordinary wheel-shaped bur, which, he has since observed, not only makes the hole, but also a series of small cuts round the circumference of it. In removing the rubber, he supposed that it had been caught by the projecting gold and, these small cuts communicating, an isolated ring was formed, which was left on the tooth, and held by the stopping until after the second visit.

Mr. J. B. SUTTON exhibited part of a skull showing considerable absorption of the hard palate as the result of pressure. The patient was an old man of sixty years of age, who when young contracted syphilis, and amongst other sequelæ perforation of the hard palate had occurred. To overcome the inconvenience of this, he made for himself an obturator of rags. The pressure of this caused the opening to enlarge, and he found it necessary from time to time to increase the size of the plug. After death the nasal fossæ were found crammed quite tight with pieces of wood and filthy rags. The anterior three-fourths of the hard palate, and the whole of the alveolar arches of the superior maxillæ, with the teeth, had entirely disappeared. The specimen had been preserved for the Museum of the Middlesex Hospital.

Dr. ST. GEORGE ELLIOTT showed a Schmidt's press, upon which he had made some improvements, for swaging plates, using a die and counter-die of Spence metal. He had found it of the utmost value, the advantages it offered being great saving of time, as compared with the use of zinc and lead dies, and more accurate work.

The PRESIDENT mentioned that he had lately met with a case of loss of sensation in the lower lip and chin on the right side together with the teeth and gums on that side, following the extraction of a lower wisdom tooth of very irregular shape. There were as yet no signs of returning sensation, although six weeks had elapsed since the operation was performed.

The adjourned discussion of Mr. Power's paper on "The Relations between Dental Lesions and the Diseases of the Eye," read at the previous meeting, was then resumed. A complete report of that discussion is given at the end of Mr. Power's Paper, page 64.

[The report of the Annual Meeting held on the 14th ult. has unavoidably to be withheld.—ED.]

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## JOURNALISTIC SUMMARY.

### DENTAL COSMOS *(December, PHILADELPHIA)*.

"THE SCIENTIFIC METHOD IN DENTISTRY" is the subject of an address by the President of the Pennsylvania State Dental Society, Dr. J. C. Green. A scrupulous regard for the Scientific Method would relieve us from a prodigious amount of jejune talk, and spare us that mental distress which is more fatiguing than labour. To discover and register resemblances and differences is the key-note and motive of all sciences. The accurate observer will often note that in looking for one result he finds another, or finds that one, and more, too, of an unexpected kind. He becomes prophetic. Here is where most observers fail. They fancy they see not what they do see, or should see, but what they wanted to see. It is surprising to see how few people are able to see truly, and truly tell what they have seen. This is the *sine qua non* of science, the anchor of its stability. Yet there are few among us who can be expected to employ the Scientific Method in its entirety. Not as professional men only, but in the common places of life, an accurate method would be of incalculable value to us and those who succeed us. Finally, the writer concludes :—" A conscientious regard for this Scientific method will sharpen our sight, quicken our perceptions, sweeten our tempers, make us more exact, more truthful, more swift to hear, more slow to speak ; above all, it will prove us to be reasoning creatures by making us in all things, at all times, and towards all men, *more reasonable*."

" A CONSIDERATION OF THE MERITS AND CLAIMS OF ARTIFICIAL CROWNS AND BRIDGE-WORK," by Dr. J. L. Williams. The writer is certain that so far as " bridge-work" is concerned, no one has yet spoken upon the subject who has had sufficient experience to speak or write even intelligently. Having referred to the removal or destruction of the pulp by a surgical method as being best calculated to leave the root in the best possible condition for its future life and health ; he describes that method in detail. Cutting off what remains of the crown will usually leave the pulp exposed at the point of its broadest diameter. An orange-wood point, which has been previously prepared as nearly as possible to correspond in size and shape with the pulp, is inserted into the canal beside it, and with one blow of the mallet is driven to the extremity of the root. The remains of the pulp will usually adhere to the wood on its withdrawal. If not, it can easily be removed with a barbed broach. If the operation is performed in a bungling or indifferent manner, it may be made a painful one ; but if skilfully executed it causes little or no pain. He speaks from an extended experience, having performed the operation many times during the the past few months. After the removal of the pulp the root may be filled in that manner which the experience of the operator has demonstrated as most successful in his hands. The one point of the utmost importance is that *it should be plugged at once.*

Ninety per cent. of the failures in the treatment of pulpless teeth arise from keeping the canal open when it should be closed. In his own practice the writer always plugs the root with the orange-wood point above referred to, previously saturating it with carbolic acid. Experience has demonstrated that this is the most perfect filling that can be placed in the root of a tooth, the wood being sufficiently compressible to allow it to adapt itself to any slight irregularity in the shape or direction of the canal.

In the case of a bridge of the six superior front teeth, if the lower incisors are directed outward and against the lingual surface of the crowns, there would be a constant tendency to throw the bridge outward. In such a case as this a square articulating shoulder should be formed on the lingual surface of the bridge. In cases of projecting incisors it is advisable in some instances to fit a gold crown over one or both of the first bicuspids.

In the January number the writer describes the Richmond Crown, which form he considers of the greatest practical value, having described the method of fitting and adjusting the crown, he recommends fixing it by means of an oxyphosphate cement. He next considers Bridge Work, and illustrations are given of the four incisor teeth being fixed to the roots of the two central incisors, and fixing the six front teeth to the roots of the two canines. The fixing of members of the molar series by this means (that is without plate), is also considered, and he concludes by saying that this work opens up a new field for the usefulness of our Profession which will bring joy to the heart of every conscientious Dentist, its possibilities are almost unlimited.

"ALVEOLAR ABSCESS," by Dr. Atkinson, is the subject of a communication read before the First District Dental Society of New York. This paper is the result of questions addressed to Dr. Atkinson by the Editor of the Society's *Proceedings*, the questions having been suggested by a cursory glance of the dental text books most in vogue.

"A NEW DENTAL AMALGAM," by A. H. Best, M.D., L.D.S.I. In this very interesting article the writer says :—For many years I used nothing but the most costly alloys, yet to my great regret the results obtained from them were anything but satisfactory, and in many cases decidedly inferior to those attending the use of cheaper grades of alloys, for which no claim of containing gold or platinum was urged as a recommendation. It would, in fact, seem that the degrees of heat necessary for the complete fusion of these metals differ so greatly—the fusing-point of platinum being so very high and that of tin so low—that alloys containing platinum or gold are really and practically so much injured thereby that in many cases the propriety of such additions is questionable.

The question of the quantivalent combination of elements, or definite atomic composition of alloys, is considered, and he observes that the failure of so many compositions is evidently due to a want of this very harmony of composition, the component parts not being in proportions that favour atomic equilibrium ; and those molecules of metal not saturated to the extent of their affinity are free to unite with any other active unsaturated molecule, or to decompose any suitable compound that they meet, and in many cases by this union set agents free which immediately attack the tooth. He therefore attempted to produce an alloy by the process of electrolysis, and success was due to a complication of apparatus for distribution of the current, which resulted in depositing from a chemical bath definite quantities of the metals held in solution, in such a manner that the strength of the solution was continually kept up by the same electric current. The alloy produced, which is precipitated in the requisite quantity of mercury, adjusted in the bath by scales, which turn the beam and break the current when the definite deposition has taken place. Thus is obtained a standard quality of alloy, which, by a proper process, is then reduced to an impalpable powder, in which state it is ready for consumption. This compound has now been practically in use and under observation for some years, and, says the writer, I have never seen a case of failure, or of discolouration of tooth-structure through its agency. When used without removing surplus mercury—a little of which is provided for greater ease and convenience of manipulation, and to have the mass of any required consistence—it is found to adhere to the walls of the cavity like cement. It is the only amalgam known that will adhere to a burnisher—which it will do in its soft state—, permitting that instrument to be used to convey it to the cavity, When it is intended to be used on grinding surfaces, or where exposed to severe attrition, it may be made almost as hard as adamant by pressing out all superfluous mercury and packing with warm instruments. When it is to be used over exposed and capped nerves, where we may be necessitated to remove it before long, if permitted to retain the excess of mercury, it will set very soft, thus permitting its easy removal. It has many qualities of great value, but not the least recommendation, in my eyes, is that, so far, I have not seen a failure. I have not the slightest hesitation in saying that it is the only amalgam I know that will absolutely preserve, and not discolour the tooth. In some mouths the filling turns quite black, but the tooth is never discoloured.

"SOFT AND TENDER MOUTHS," by Dr. F. A. Faber. The question is asked: Is it not reasonable that, when the teeth have been forcibly extracted, while yet their roots remained sound, the irritation which follows, and which is maintained by the sharp edges of the bony sockets, results in an absorptive activity which leaves a firmer and denser condition of the soft tissues than when the process of absorption is of the character before alluded to?

As a mouth wash, phénol sodique had been successfully used when other medicaments had failed to give any benefit.

The report of the American Dental Association occupies three pages, and that of the Odontological Society of New York over thirteen pages, the subject of the latter being a paper and discussion on the "Treatment of Children's Teeth." There is also a report of the regular meeting of the First District Dental Society, State of New York.

### DENTAL COSMOS *(January.)*

"THE CONSIDERATION of the Merits and Claims of Artificial Crown and Bridge-Work" is concluded in this number, and a notice of this section of the article follows that of the first portion (page 84).

"EXPERIMENTS WITH CELLULOID and the New Mode Heater," by Stewart J. Spence. The writer records some results of experiments with Celluloid and the New Mode Heater. He finds that plaster investments require one and a-half hours to dry in the oven of the heater, with the thermometer at 400°. Celluloid may be moulded in from five to ten minutes, at 320°; in about twenty to twenty-five minutes it degenerates, becoming hard, brown, brittle, and porous; and in from twenty-five to thirty minutes it burns up. It will burn at either low or high temperatures, according to the length of time it is exposed to them, as well as their degree of heat; thus it is unsafe to leave it at even a low heat for a long time, as in slow cooling celluloid is more liable to spoil if not under pressure, and those parts of the blank least subjected to pressure are most liable to come out damaged, therefore flasks should be closed with all expedition. Celluloid unless worked at high temperatures so as to flow readily and with slow hardened plaster, will press the model of shape and the teeth out of position. Steam brought in contact with heated celluloid makes it puff out and degenerate. Plaster retains heat longer than metal, and therefore plaster left in the oven to cool may spoil or burn up even when the temperature of the heater has fallen to a lower degree. Tin foil discolours celluloid, making it browner at a high heat. Celluloid, after moulding, is hardest at the surface.

"SYPHILITIC TEETH" is the subject of an article translated from the French of Alfred Fourner. The hereditary influence of syphilis shows itself in the Dental system in two ways, very unequal in point of diagnostic value, viz., first, by retardation of evolution; second, by the arrest of growth and by modifications of structure. With regard to the first, the retarded eruption is especially marked in the first dentition, while some cases show a similar retardation in the eruption of the permanent teeth. This condition is but a localised expression of a more general fact, or namely, the retardation of development among persons affected with hereditary syphilis. Under the second head are enumerated Dental erosions, micro-dontism—the reduction below the physiological volume of certain teeth; Dental morphism, that is, certain teeth lose more or less the attributes of their proper size or type; vulnerability, the Dental organs being more readily acted upon by the causes of attrition and disorganisation—in other words, rapid wear and ready change, and early decay of certain teeth. Reference is next made to the meaning of the term "syphilitic," and, with regard to the history of the subject, credit is given to Mr. Jonathan Hutchinson for originating it. The writer considers that hereditary syphilis can influence both dentitions, though it was thought at first, with Hutchinson, that the second dentition alone was susceptible to it; yet the first dentition appears very much less often influenced by hereditary syphilis than the permanent dentition. Dental malformations are commonly multiple and symmetrical, that is to say, we find several teeth affected as a rule, usually the corresponding teeth are similarly affected. The different forms of tooth malformation are next considered, and several varieties of Dental erosion are dealt with. The article is to be continued.

The Report of the American Dental Association is continued, and this, together with the Report of the New York Odontological Society, occupies twenty-one pages.

### THE DENTAL REGISTER *(January, CINCINNATI)*.

The first article is a biographical sketch of the late Dr. James Taylor, of Cincinnati, which is accompanied by an engraving of him.

"PROSTHETIC DENTISTRY," by C. B. Porter. This is the subject of a Paper read before the Michigan State Dental Society, in which is considered the several forms of face, and the changes which take place as the result of the entire loss of the teeth. Though the variety of facial outline is very great, the writer thinks they may be readily and naturally reduced to three classes, viz., the oblong faces, the round faces, and the pyriform faces.

"ON EROSION," by Mr. Alfd. Coleman, F.R.C.S., being the Paper that gentleman read before the International Medical Congress in 1881. There are also several short articles selected from other journals.

### ITEMS OF INTEREST *(December, PHILADELPHIA)*.

A report of the meeting of the Pennsylvania State Dental Society is continued and occupies five pages.

"OUR PERIODICAL LITERATURE," by Dr. Louis Ottofy. A notice of this article was given in the last number of the *Dental Record* in the "Summary" of the *Missouri Dental Journal*.

"DENTAL SOCIETIES," by Dr. A. C. Schall. Such societies cultivate the higher powers of the mind and best impulses of the heart. The older members cull from years of experience, while the younger members can impart the newest discoveries, theories, and inventions. Among the effects of social union, one of the most pleasant is that we are brough together and become acquainted with each other's personal characteristics, and learn something of those better qualities that exist in every man, and which have a tendency to make us more charitable and kind towards one another.

"DENTAL CARIES, THE RESULT OF CIVILISATION," by Dr. S. H King. This is an article criticising the conclusions of Dr. Barrett upon an examination of two hundred skulls of pre-historic races; an article upon them having been published in the October number of the *Dental Practitioner.* The Critic asserts that those ancient Peruvians were a highly civilised people, having their ornamented temples and sufficiently advanced to have learned the culinary art, and to this may be attributed largely the abnormal condition in which are found the teeth in their remains. The writer believes that habits of civilisation have produced the results which we find to-day, and Dr. Barrett's investigations confirm him more strongly in this opinion.

"PULLING THE WRONG TOOTH" is a portion of a discussion which took place at a meeting of the New York Odontological Society.

"IS DENTISTRY A SPECIALITY OF MEDICINE," is the subject of some observations, by Dr. L. C. F. Hays, at a meeting of the Southern Dental Association. There is a btief epitome of the paper here published; and the writer concludes that Science, as applied to Dentistry, has already done enough to rank Dentistry equally high with the other specialties of Medicine, let the men representing it do their duty.

### ITEMS OF INTEREST *(January).*

"EXTRACTING FOR IRREGULARITIES," is a part of a discussion before the New York Odontological Society, in which Dr. Kingsley and others took part.

"CLEFT PALATE, Hare Lip, and Staphyloriphy," are the subjects of the notes of some cases under the care of Mr. Christopher Heath, an account of which was published in the *British Journal of Dental Science.*

"SENSATION AND PAIN, and Past Efforts to Control Them" by Dr. Levi C. Lane. The writer gives a short account of the history of means adopted to induce insensibility to pain.

"TOOTH STRUCTURE," by Dr. W. G. Britton. The writer maintains that a lamellated structure can be proven to exist in dentine as a normal feature beyond the possibility of a doubt. To show this form of structure the tooth should be placed in a hot solution of caustic potash, of a strength of at least 50 per cent. In about fifteen or twenty minutes the cementum may be removed from the apex in the form of a cap; and, by repeated maceration and scaling, the lamellæ of the dentine may be removed down to the pulp cavity.

"OVERCOMING HEREDITY," by Mrs. M. W. J. This article is reproduced from the *Southern Dental Journal,* and a notice of it will be found on page 569 of the previous volume of the DENTAL RECORD (December, 1883).

"EXTRACTING TEMPORARY TEETH" is a portion of a Report of the Meeting of the New York Odontological Society, in which Dr. Kingsley and others took part, special reference being made to the extracting of teeth for regulating purposes.

A Description is given of the "PROCESS OF DIGESTION," by Dr. W. S. Elliott. "Seeking to Chisel from Dr. W. S. Barnum his Honour," is the title of an article by Dr. G. A. Mills, in which the writer maintains the credit due to Dr. Barnum for introducing the Rubber Dam.

There are reproduced from the *Southern Dental Journal* three letters "From a Mother to a Mother," by Mrs. M. W. J.

"THE TREATMENT OF EXPOSED PULPS" is the subject of a Paper read some time ago before the Odontological Society of Great Britain, by Mr. George Henry, L.D.S.Eng.

"Treating Children's Teeth," "Treatment for Dyspepsia," "Rules for Trismus," and "Method in Thinking and Acting as essential to Skill in Manipulation," are subjects of editorial articles.

### THE SOUTHERN DENTAL JOURNAL *(January, ATALANTA)*.

"LETTERS FROM A MOTHER TO A MOTHER, on the Formation, Growth, and Care of the Teeth," by Mrs. M. W. J. Letter VII. deals with the Effects of Disease upon Tooth Structure; Letter VIII., Dentition and Disease; Letter IX., Care of the Teeth; Letter X., Warming Infant's Food; and Letter XI., Why the Baby Teeth should be Preserved.

"THE USE OF ANÆSTHETICS," by Dr. Charles L. Steel. The writer quotes from Dr. J. J. Chisholm regarding directions for administering an anæsthetic. The writer next details the different positions which he considers most suitable for the extraction of teeth, and says, other things being equal, the most rapid Dentist is the best; for without anæsthetics, our patients wish a painful operation completed as soon as possible, and with anæsthetics, the shorter the time the less danger from blood. He then briefly alludes to the two modes of death from anæsthetics, viz., failure of the heart's action, respiration continuing; and failure of respiration, the heart's action continuing. In the first case the patient should be invested and nitrite of amyl administered; in the second, artificial respiration, raising the patient to an erect position—which induces the diaphragm to fall and an inspiratory act to result, then lowering the body again, by which means the diaphragm is pushed up, producing an expiratory act.

"DENTISTRY IN CALIFORNIA," by Dr. G. H. Perrine. He finds that the earliest record of Dentistry in California dates from the year 1824. The Dental pioneer who invaded the wilds of the West being Dr. George Wellington, an Englishman. There are to-day nearly three hundred Dentists in California, and the State can boast of her Colleges and Associations and ably conducted Professional journals. The writer concludes that of 1,000 from the 13,000 Dentists practising in the United States, 163 died before they reached middle life, 643 attained fair success, 57 made fortunes, 27 died from intemperance, 96 failed entirely, and 31 committed suicide.

"Thumb Sucking in Childhood as a Cause of Subsequent Irregularity of the Teeth," is an article by Dr. T. H. Chandler, selected from the *Boston Medical and Surgical Journal.*

**THE DENTAL ADVERTISER** *(January, BUFFALO).*

"Dentistry and Otopathy," by Dr. F. Park Lewis. The writer having described something of the anatomy and physiology of the ear, refers to certain conditions of the teeth as causes of ear disease, referring to the observations of Mr. Kempton, Mr. Liston, Mr. Weiss, and other English writers.

"Progress of Histology and Biology," by Prof. J. H. Wythe. The writer deals particularly with what biology teaches about life in general and living matter in particular, discussing at some length the network theory of connection between protoplasmic masses. The article is taken from the *Pacific Medical and Surgical Journal.*

"The Cause of the Failure of Gold as a Filling Material" is the subject of a Paper read before the American Dental Society of Cologne by Dr. A. A. Blount, and reproduced from the *Independent Practitioner.*

"A Vindication of Professional Skill" that is worthy of notice is an article taken from the *Missouri Dental Journal*, and has reference to Dr. Rigg's treatment Pyorrhœ Alveolaris.

"Danger-Carelessness," is a short article from the *Dental Register*, having reference to the care and precaution that Dentists should take to cleanse their instruments, etc., from disease germs. There are two or three other short articles selected from Dental periodicals.

**THE INDEPENDENT PRACTITIONER** *(January, NEW YORK).*

"A Day's Practice," by Dr. N. S. Jenkins. This was the subject of a Paper read before the American Dental Society of Europe at Cologne in August last. The writer gives some amusing sketches of a day's practice, and relates the treatment of several cases.

A Reply to some views of the Putrefactive "Theory of Decay," by Dr. W. D. Miller. Dr. Miller replies to an article written by Dr. Stockwell in the November number of the *New England Journal of Dentistry*, on "Micro-Organisms the essential factor in Dental Caries." Dr. Miller points out certain errors which Dr. Stockwell has fallen into, and he thinks his conclusions should be accepted with reserve when they differ from those of the investigator, or when they are based upon no experiments at all. Dr. Miller has certain preparations in which he has produced caries, and which to the naked eye, as well as under the microscope, is not to be distinguished from natural decay. By that artificial method the characteristic phenomena of caries began to show themselves in ten weeks, and Dr. Miller challenges Dr. Stockwell, and all those of his or any other belief, to discover and publish a process by means of which, without the aid of acids (by putrefaction alone) one may accomplish what he has done. Then, and not till then, can they demand that their views be accorded a serious hearing. Dr. Miller has claimed for many months that the acid of tooth caries is produced in the mouth by fermentation, and he was for a long time uncertain whether the ferment was organised or mechanical, and it required a vast amount of labour to show that it was the former. Fungi often contain other ferments than such as produce acid, many contain a ferment similar to Diastase, some a ferment like Invertine, one, at least, contains a ferment which dissolves coagulated albumen and converts it into Peptone, some even contain a ferment which produces Ammonia. The critic remarks that the product of putrefaction being always alkaline, then if caries is simply putrefaction, decaying dentine should always have an alkaline reaction, while, as a matter of fact, this reaction is constantly acid. He then goes on to say that he has scores of preparations of carious enamel, and that he has already stated that in caries of the enamel micro-organisms are agents of no consequence whatever, except in as far as they, by fermentation, may lead to the production of acid. After some further criticisms, the writer concludes by recommending those who maintain that a purely putrefactive bacterium with its alkaline products is the cause of Dental Caries ; first, to establish by experiment that such a bacterium exists in considerable numbers in the deeper parts of carious dentine ; second, to determine the species of the said bacterium ; third, to isolate it by pure culture, and study its morphology, physiology development, etc. ; fourth, to prove that in pure culture it can cause the decay of enamel and dentine.

" RELATIONS OF FOOD TO THE TEETH," by Dr. E. C. Kirk. The writer observes that if we would successfully combat the ravages of Dental Caries, our attention must not cease after we have restored, by filling, the tissue which has been destroyed ; but by instructing our patients—and especially the parent and guardian in the case of children—as to the proper course and mode of living to be pursued during the period of the calcification of the bones and teeth. We can secure for them the kind of nourishment required to ensure practically sound Dental organs in many cases. For the past eighteen months he has had under his care the mouths of three or four hundred children, pupils of the Pennsylvania Institution for the Deaf and Dumb. In those whose deafness is acquired through disease, viz., scarlatina, measles, cerebro-spinal meningitis, the teeth frequently bear evidences of the high febrile conditions through which the patient has passed, by pits in the enamel, crimping edges, defective form, imperfect development, or soft structure. The majority of the pupils are between the age of ten and twelve years. When they first come to the institution there are many whose dentures are riddled with caries, pulps exposed, and the teeth apparently melting away. After a year's residence a marked improvement will be observed in the character of their teeth ; they will be found exceedingly hard and dense, making the wear and tear on cutting instruments very great. Excavators and chisels have to be tempered to the point of brittleness to be effective in preparing cavities, otherwise they will not cut extremely hard structures ; the teeth are also firmly set in their sockets making them unusually difficult to extract. These are not visionary observations, but the result of repeated tests and examinations carefully made. But the most conclusive evidence that he has met with of their table diet, so far as the nutrition of their teeth are concerned, is the unusual number of cases of arrested caries, and the formation of the tissue called secondary dentine. The diet table is given in which the writer observes, there is an abundance of bone-producing material given, and a proper balance maintained between the starchy and saccharine on the one hand, and the fatty and nitrogenous constituents on the other.

"A NEW METHOD OF FILLING TEETH," by Dr. Catinnare. The writer describes a method of using gold which he saw at a meeting of the Society of German Dentists held at Frankfort-on-the-Maine; the so-called "Magnetic Gold" was employed. This is a form of very soft, and at the same time, cohesive gold. The cavity is prepared in the usual way, but no retaining points are made, a slight undercut being all that is required. No mallet is used, and the first instruments employed are not unlike the burnishers used for finishing fillings with the Dental Engine. A few cylinders are placed on the floor and against the walls of the cavity, and while the engine point is being rotated it is pressed upon the gold which is thus easily burnished into place. When the foundation of the filling is laid, another instrument is employed which may be made by breaking off the head of an engine bur, placing the rest in the engine, and guiding the end upon an oiled Arkansas stone; the point not being polished is, when in use, soon coated with a film of gold. Instead of burnishing the surface, therefore, and giving to it a high polish, it merely condenses it, and leaves upon it a dead surface that does not prevent the cohesion of fresh pieces. In this manner gold may be introduced very rapidly, and a large filling may be made in a comparatively short time. The German Dentists, who are employing this method, claim that it is a great improvement upon the old way of filling teeth.

"THE USE AND ABUSE OF GOLD as a Filling Material," by Dr. A. N. Roussel. It has been thought for a long time that in the majority of cases gold was the only fit substance; certainly it will make a good filling, and the use of it in the hands of capable operators has done great good; on the contrary, the abuse of it in the same hands has done much harm. There is a general impression prevalent among our patients that gold is always the best material with which to fill teeth, simply because it is gold, and they would always prefer it were it not for the extra expense. As to the legitimate use of gold, the writer suggests that the incisors and canines should be filled with gold, but behind the cuspids by the use of something else—amalgam chiefly—thousands of bicuspids and molars have been successfully filled with gold, but in the case of simple crown cavities, in those teeth in which the pulps are alive and healthy, he cannot conceive of one that cannot be as successfully filled with amalgam as with gold. His reasons for preferring amalgam to gold are, that it requires less time, less nervous exhaustion, and less money; all these considerations particularly interest the patient. He denounces the building of gold crowns upon the devitalised remains of what was once a tooth. Any devitalised tooth requiring two books of gold to fill, or rather to build, it into the semblance of a tooth, is not fit to fill; it is a case for an artificial substitute, and there is nothing so thoroughly indicated as a good tooth crown, either of gold or porcelain, and of which we have a great variety. For the anterior teeth, where not more than a third or quarter crown is left, cut it off and attach a porcelain crown, and a result will be obtained that could never be hoped for with a gold plug.

## NEW ENGLAND JOURNAL OF DENTISTRY.

*(January, SPRINGFIELD.)*

"Concerning Records," by Dr. George L. Parmele. The writer describes and illustrates the plan of keeping the records of his practice. Sketches of his appointment cards and notes relating to treatment are given ; and he concludes by stating that his plan is not presented for Dentists who will not care to take the trouble about their records that this system seems to require ; but for men who enjoy thinking and reading, and who devote time and thought to their records and literary pursuits, the system may prove of value.

"Aconite," by Dr. G. A. Maxfield. The writer deals with the history, botany, preparations, and physiological effects of aconite, alluding to its use in neuralgia, inflammation, and particularly in inflammation connected with the teeth. With regard to the treatment of alveolar abscess, he says, when it is desirable to save the teeth and suppuration cannot be prevented, and there is more or less accompanying fever, the internal use of aconite is indicated ; it may be given in from one to two drops of the officinal tincture (always in water) every twenty or thirty minutes, until eight or ten drops have been taken, or until there is a marked change in the pulse and temperature.

"A History of Dentistry," by Dr. G. H. Perine, is continued, and this short section deals with England and her early practitioners and writers.

"The Folly of Extracting Teeth," by Dr. Hyman Rosa. This was the subject of a Paper read before the third district Dental Society of New York, in which the writer advocates saving teeth, and urges his readers to be more steadfast in the conservative department of our specialty, and by precept and example fearlessly do our best to promote such a healthy reaction in the minds of our patients that "pulling teeth" will be a byword of reproach among all thoughtful and intelligent individuals.

"Something for Dental Chemists," by Charles Mayr, is a short Paper dealing with the action of certain chemical agents upon tooth substance.

The editorial article refers to the history of the Rubber Dam which Dr. Barnum brought before the Profession in 1864. Another editorial article reviews the article published in the *Dental Practitioner* for December last, by Dr. Miller, of Berlin.

# Editorial.

## UNITY IS STRENGTH.

The professional zeal that has been displayed in the provinces during the past month is worthy of comment. In the preceding pages an account is given of a meeting at Birmingham on the 12th and in Manchester on the 22nd ult. The gathering together of Members of the Profession at the first-mentioned town was for the purpose of considering the desirability of forming a Local

Society. Opinion was about equally divided between the proposed Society, and the sufficiency of the Midland Branch of the British Dental Association. Each section of the meeting exhibited more than a small amount of preference for its own proposition, and the enthusiasm that was manifest was indicative of a Professional activity that has much to commend it. But discord was mingled with zeal.

In Manchester an assembly was formed to facilitate the publicity of a new Institution—the Victoria Dental Hospital—which has recently been founded. In July last a similar Institution was established, and since that time it has been doing its work as a charity. The latter Hospital did not meet with the approbation of all the principal Practitioners in Manchester, and a second charity and school were promoted. At the meeting a little acrimony was shown, and the public were made aware of the existence of considerable Professional jealousy and weakness. Fortunately it was at length decided to endeavour to bring about an amalgamation of the two forces, and if this is done success may be anticipated for one Dental Hospital and School, but not for two such Institutions. It must be remembered that the Liverpool School is in the same county, and also that a Dental Hospital cannot be carried on in an efficient and useful manner without students. Therefore, let not the hope be blighted that, in Manchester at all events, the Dental Profession may be saved from the humiliation of a public exhibition of inward strife and apparently threatened dissolution.

If the active energy, which in both instances was dominant, could be directed into one channel for each scheme, much more good could be accomplished than could possibly be achieved if dissent, antagonism, or apathy, were permitted to supervene. At this time, when concentration of effort to further the advancement of the Profession is most needed, surely these several differences will be overcome, that the Strength of Unity may prevail.

## OBITUARY.

THE death of Mr. JAMES WATSON KEKWICK, The Crescent, Carlisle, occurred on January 23rd; and on December 22nd, at 3, Wellesley Villas, Croydon, that of EDWIN WILLIAMS, late Member of the Council of the College of Dentists of England and of the Odontological Society, in his sixty-fourth year.

## GOSSIP.

An Association of Dentists possessing a registrable diploma has been formed in Sheffield, the objects of which are the encouragement and diffusion of knowledge of Dental Surgery, to advance the interests of the Profession, and ultimately to establish a Dental Hospital in the town. The meetings are held monthly from October to June, the Paper for the evening being read at the residence of the author. In February last the President (Mr. Jos. Harrison) gave his Address, and the following Papers have since been read:—"Dental Ethics," by Mr. Brindley (Vice-President); "Injuries by Violence," Mr. Pike (Hon. Sec.); "Necrosis," Mr. Mahonie (Hon. Treasurer); "Hæmorrhage," Mr. Stokes; "Exostosis," Mr. Drabble; after all of which interesting discussions took place in which most of the members joined.

A curious case of unusual tooth development has been reported. A Hindoo boy of fourteen, came to hospital with a growth inside his nose. The affection caused pain and annoyance, and led him to seek medical advice. When the growth was removed, it was found to consist of a tooth, resembling a canine in shape. Through some abnormal development, a tooth-sac had been formed in the lining membrane of the nose, and in this unusual situation the offending body had grown as described.

The Annual Report of the Surgeon-General of the United States Army for 1883 states that 48 recruits were rejected on account of Dental insufficiency, that being a ratio of 8·05 white and 11.47 coloured, per 1,000 recruits rejected. One white soldier was discharged for having defective teeth.

Mr. D. Watson, L.D.S.Eng. (late of Torquay), has been appointed, Honorary Dentist to the Helvetia Home for Invalid Ladies, Mentone, Alpes Maritimes, France.

Henry Forbes Winslow, M.D.Lond., M.R.C.S., &c., has been appointed anæsthetist to the National Dental Hospital.

Mr. C. Vincent Cottrell, L.D.S.I., has been appointed Dental Surgeon to the Children's Hospital, Paddington Green, W.

Mr. Harry L. Pilling, L.D.S.Eng, has been appointed House-Surgeon to the Dental Hospital of London, and Mr. S. C. Buckland has been appointed Assistant House-Surgeon to the same Institution.

While a servant girl in Thurso was cleaning a codfish in December last she found in its stomach a complete set of false teeth.

Correspondents are requested to note the new address of the office of this journal—3, Little Windmill Street, Golden Square, London, W.

THE

. DENTAL RECORD.

VOL. IV. MARCH 1, 1884. No. 3.

# AN IMPROVED METHOD OF AFFIXING ARTIFICIAL TOOTH-CROWNS TO NATURAL ROOTS.

By A. H. BEST, M.D., L.D.S.I.

WITHIN the last decade there have been many marked improvements in the methods heretofore in use for affixing artificial porcelain tooth-crowns to natural roots; a great number of new plans have been suggested for this operation, each offering peculiar advantages, and some particularly appealing to our appreciation for mechanical ingenuity, as well as for artistic effect. There are, nevertheless, shortcomings which place the majority of these inventions out of the pale of universal adoption, and thus deprive the Dental Profession of these valuable auxiliaries, whereby many might realize that important Utopian idea, "the greatest good to the greatest number."

In discussing this important branch of conservative Dentistry, it is not the intention of the writer to criticise the various particular methods at present offered to the Profession, or to point out such arbitrary defects in those systems as have seemed to present themselves; for it cannot be denied that each contrivance before the public has its especial advantages, in many cases of great value; and we can scarcely expect any one method to combine all the admirable qualities presented by the others separately. Nevertheless, it is possible, though perhaps only to a limited extent, to overcome the difficulties which beset those not much versed in the complicated and skilful manipulations required, and thus to avert the failure, which is but an expected sequel to improperly executed work of this class.

The consideration of this subject will be considerably facilitated by dividing the various methods into two principal systems, viz., those where the tooth-crown being adjusted the patient leaves the Dentist with the operation complete; and those which depend for completeness upon favourable circumstances hoped for after the patient leaves the chair. It will thus be seen that the line is drawn between plastics and non-plastics for attaching artificial tooth-crowns to natural roots. The distinctive feature of the plastic system is the reliance placed on amalgam or other cements to hold the crown in position; whereas what I shall style the non-plastic system employs some mechanical device for this purpose, and although not disdaining the assistance of cement, yet by no means principally depending upon it; such precautions being observed when plastic cements are used, that either they finally set before the patient leaves the chair, or should this not be the case, the nature of the mechanical contrivance is such as to dispel all doubts of ultimate success, premising of course reasonable caution on the part of both operator and patient.

The distinction indicated by the terms "plastic" and "non-plastic" is of logical importance to the manner in which the subject is herein treated, and these terms are consequently used rather for convenience than to express so exact a meaning as they generally imply.

It is by no means an unfamiliar fact that tooth-crowns are often affixed to roots by means of a purely mechanical nature. We are carried back in fancy to the old style—perhaps the oldest style—which relied for this purpose on wooden pivots. The metal pivot naturally followed this early device, as a development of the idea, and from the metal pivot it was but a step to the metal screw. These evidently illustrate the earliest non-plastic devices.

The wooden or metallic pivot, or metallic screw, gave excellent results with a healthy root, not seriously affected by caries. With a much decayed, fragile root, when an urgent necessity impelled the operator to seek some other means of attachment for the artificial crown, he was evidently constrained to employ plastic cement; at first indeed in combination with the old devices, but later, as if throwing off the shackles of the old idea, it was used quite independent of any mechanical fixture. This brings us to the new era of this class of work, viz., the attaching artificial tooth-crowns to natural roots by means of plastic cements.

This principle of the use of plastics has given rise to many very meritorious suggestions tending to generalise the application of this means of attachment. I, however, exceedingly regret that my own experience, and observation of the experience of others, do not seem to justify the sweeping assertion that this is all we could wish.

So much the reverse to this hoped for ultimatum has been the result of unbiassed observation in these cases, that I am forced to rely upon accurately constructed mechanical devices, properly adjusted, with only enough of some plastic material to make a perfect joint, in all cases where the circumstances will permit, and when there is a reasonable hope of remuneration in any way commensurable with the important services rendered. The method of constructing such devices will vary with particular conditions, since each case is a law unto itself, it being only necessary to observe those general principles of a mechanical and pathological nature, inseparable from successful execution.

It is, however, a fact generally admitted that the various devices which bear evidence of superiority, and warrant a hope of anything approaching permanence, are beyond the mechanical ability of the average operator, while a want of time is a serious difficulty to those occupying the position of bread-winners, etc. Yet there are cases in which this class of work is indicated, and alas! in too many.

*(To be continued.)*

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# ELECTRICITY: AND THE ELECTRIC LIGHT: IN REFERENCE TO DENTISTRY AND SURGERY.

By C. J. Boyd Wallis, L.D.S.Eng., &c.

## Part VIII.—Batteries—*Continued.*

The Watson Battery, or Dale's Signal Battery.—These batteries are similar in construction, and differ only in the solutions employed. They are clean, cheap, simple in construction, and easily attended to. The Leclanché and Manganese cells, excellent as they are, rapidly polarize when in continuous work, and, consequently, require inconvenient intervals of rest, while the rapid fall in electromotive force is annoying and troublesome to the operator. These defects are entirely avoided by the above cells, and for this reason may be recommended for closed circuit work, or any purpose requiring freedom from polarization.

This battery (Dale's), Fig. 18, consists of an inner lead cylinder which forms the positive element, and a massive zinc ring, suspended from the cover by means of brass rods, forms the negative element. The lead cylinder is conical and perforated at the lower end, and both elements are connected with binding screws placed in the cover.

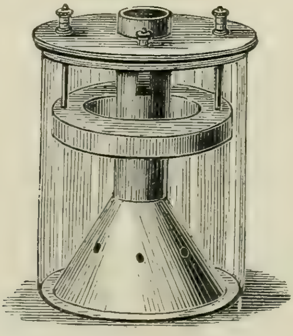

Fig. 18.

The exciting fluid is a strong solution of sulphate of copper, and the copper deposited by the action of the battery is of considerable commercial value. This battery is largely in use for telephone exchange work, and has worked on short circuit with less than two ohms resistance for twelve hours per day for two months.

Watson uses the following solution--one quarter pound of sulphate of zinc and two quarts of water, with which the jar is filled nearly two-thirds full; the elements are then placed in position, and from one half pound to three pounds of sulphate of copper, according to the use made of the battery, are dropped into the cylinder at the top. For constant use the larger amount of sulphate of copper should be employed. The Watson jar is nine inches high and six inches in diameter; and the battery is said to be stronger than Daniell's.

THE MAYNOOTH (CALLAN'S) BATTERY.—A large battery was constructed by Callan in which cast-iron formed the positive pole, being immersed in strong nitric acid, the zincs dipping into dilute acid. The iron thus is not acted upon by the acid, but assumes a so-called *passive state*, and in this condition its surface appears to be impregnated with a film of magnetic peroxide, or of oxygen.

Poggendorff (Liebig's Annal. xxxviii., 308) has employed plates either of sheet-iron or cast-iron instead of either platinum or carbon; in strong nitric acid the iron is totally unacted on; but if the acid becomes diluted till it has a specific gravity of 1·35, or less, it is liable to act upon the metal with uncontrollable violence.

A battery of cast-iron and zinc, arranged in such a way that the former is separated from the latter by a porous jar or diaphragm, the iron being excited by a solution of saltpetre and sulphuric acid in water, or by dilute nitric acid, and the zinc acted on by dilute sulphuric acid, affords great intensity. Such an arrangement is known as the *Maynooth Battery*.

In the earlier experiments for the production of the electric light by battery power it was found that unless a stream of Electricity, both regular and powerful, was supplied, no useful effect was produced, or, in other words, that constancy and intensity in the battery employed were essentials to success. The cheapest battery elements were found to be iron, lead, and zinc; but even with these the consumption of metals and chemicals surpassed the value of the Electricity produced, and something more was left to be accomplished.

Hitherto the products of such a battery as the "Maynooth" had been thrown away; these were the nitrate and sulphate of iron and sulphate of zinc, the actual value of which was so trifling and the demand for them so limited as to render the residuary liquor of the Maynooth Battery practically worthless. Therefore, it was evident that before such batteries would become of any importance, from a commercial point of view, these waste battery solutions must be turned to some profitable account, whereby the cost of the Electricity would be proportionately reduced Therefore, to this object Dr. Watson directed all his energies, which resulted in a great number of the most delicate and painstaking experiments, and led to the conversion of the hitherto refuse liquor of the Maynooth Battery into products of great commercial value.

It was known that certain salts of iron and lead, when mixed with certain chemicals, produced a number of beautiful pigments of great delicacy and purity. Dr. Watson acting upon this adopted it as a means of employing to a profit the waste liquor of the battery which resulted in showing that the production of light and colour from the same elementary bodies was perfectly practicable. In this way the conversion of the cast-iron and zinc apparatus of Maynooth into a chromatic battery was effected. The process by which these pigments were produced was as simple as it was beautiful. As already stated, in the Maynooth—iron and zinc—battery, nitric and sulphuric acids are employed in a diluted form, which result in waste solutions of nitrate of iron and sulphate of zinc. Instead of disposing of these residuary solutions as useless, they are separately removed from the chromatic battery, and, having been brought to a certain heat by means of steam, are blended with a solution of prussiate of potash, which, with the iron solution, throws down a splendid blue pigment—Prussian blue, of great purity, whilst with the zinc solution it precipitates a fine ultramarine blue.

Finally, these precipitates are drained on cloth stretchers, subsequently pressed, and gradually dried in carefully heated chambers; the result is a pigment suitable for employing in the fine arts, for house decoration, or paper-colouring. Other colours of great beauty may be produced by certain combinations, as by boiling the zinc yellow with lime in varying proportions, according to the depth of colour required, which results in an electric red of great brilliancy; by combining the zinc yellows with the iron blues, innumerable shades of green are produced possessing the property of standing high temperatures without injury. Yellows of an infinity of shades and delicacy of colour may be produced by treating the waste solutions of the lead and nitric acid compartments of the battery with chromate of potash.

If instead of the chromate, prussiate of potash be added to the residuum of the lead and zinc battery, a delicate white pigment will be the result, possessing, with great body, the property of not blackening by exposure to sulphuretted hydrogen gas, protected, as it appears to be, by the zinc-salt in the compound. In a similar manner, the addition of chromate of potash instead of the prussiate, to the residuum of the iron battery, yields a brown pigment of considerable depth of colour.

HIGGINS' BATTERIES.—With the same object in view, namely, the reduction of the cost of galvanic currents by utilizing the chemical products of the battery solutions, Messrs. J. & A. J. Higgin, manufacturing chemists, of Manchester, have recently (1882) patented several improved forms of battery, in which they employ elements and chemicals which produce useful or valuable chemical products. To effect this they substitute tin for the zinc usually employed as a positive element, and by simple means recover the tin in a form suitable for certain chemical manufactures, into which that metal enters as a principal ingredient.

These batteries are made up of a tin element and a carbon rod or plate, the latter being surrounded by pyrolusite or native peroxide of manganese, broken into small pieces, the size of peas, with dilute sulphuric acid (1 acid to 5 to 10 water) as an excitant. When the battery is in action the dilute acid produces protosulphates of tin and manganese, which remain in solution. When it is necessary to renew the liquids, the saturated or partly saturated solution is treated in the following manner to separate the tin therein contained. Sufficient peroxide of manganese in fine powder is added to the solution, which may be heated, to cause the protosulphate of tin to become persulphate. When the reaction is complete the liquid is diluted with hot or cold water, when a precipitation of stannic acid or stannic oxide takes place. When this has been washed with water until free from soluble salts of iron and manganese it is thrown on a filter and drained to a paste, and may then be treated in various ways to produce valuable chemical products. Dissolved in an aqueous solution of caustic potash or soda, it forms the stannate of soda or potash, well known in the arts of calico printing and dyeing. Dissolved in hydrochloric acid, it forms bichloride of tin, also used in calico printing and dyeing, and by the addition of metallic tin to this latter, the bichloride of tin by assimilating more tin, becomes protochloride of tin, which may be at once used in the arts, or the solution may be evaporated and crystals of protochlorlde of tin be obtained. Several other modifications may be employed, and, as an instance of one of them, the dilute sulphuric acid in the porous cell containing pyrolusite and a carbon rod or plate is replaced by a solution of persulphocyanide of iron, and in this case the pyrolusite is omitted. The solution of persulphocyanide of iron may be conveniently made by dissolving a persalt of iron, such as persulphate or perchloride in water, adding thereto an alkaline or earthy sulphocyanide, in chemical proportion to the iron salt employed. A convenient strength for the persulphocyanide of iron solution may be 50 grains of the compound

$Fe_2(CNS)_6$ in each ounce measure of water. In proportion as the outside cell becomes charged with sulphate of tin, the liquid in the porous cell becomes changed from persulphocyanide into protosulphocyanide of iron and free hydrosulphocyanic acid. By introducing a current of air by means of a small glass tube passing down to the bottom of the porous cell and connected with a bellows, the continual reconstitution of the persulphocyanide is effected by the oxidising action of the air.

In the well-known Bichromate Battery, a plate of zinc is suspended between two carbons, and the exciting solution is either of chromic acid or a mixture of bichromate of potash and sulphuric acid. An element of tin is substituted for the zinc in Messrs. Higgins' modification, and as an excitant a mixture of either dilute hydrochloric or sulphuric acid and one or other of the salts of iron above mentioned. The strengths of the acids may be as previously described, and the quantity of iron dissolved therein in the persalt employed may be equal to 20 grains of peroxide of iron in each fluid ounce.

Of the batteries mentioned only one will be described, namely, the two-chamber cell, which supplies a current of moderate power but a constant and long-continued one. It consists of a rectangular vessel of stoneware or glass of about six inches long, four inches wide, and six inches deep. This vessel is separated by a porous slab which rests against a projection on the side of the vessel. A carbon plate is arranged in one division of the cell, about an inch from the end, and a mixture of pyrolusite and gas carbon is packed around it. In the other and larger division of the vessel is placed the tin element; and both chambers are filled nearly to the top with dilute sulphuric acid. The connecting copper wires pass through a glass slab which forms the cover to the cell and is cemented to it. The tin element is placed about half an inch from the porous slab.

HIGGINS' CASCADE BATTERY.—Another form of battery, of low internal resistance, has been introduced by Mr. F. Higgins, and is manufactured by Messrs. Johnson & Phillips, of Victoria Road, Charlton, S.E. This battery is of the circulating kind, in which the exciting solution passes from cell to cell by gravitation, and maintains the action of the battery as long as it continues to flow. It is claimed for this battery that it furnishes a current of greater volume and constancy than that furnished by the ordinary voltaic batteries. The cells are arranged for a single fluid, and when in action are placed upon steps, in order that the solution may flow from the upper cell through each successive cell by gravitation to a reservoir at the bottom. The top and bottom reservoirs are of equal capacity, and are fitted with taps, by which the flow of the solution is regulated and drawn off.

Fig. 19 shows a sectional drawing of this battery, which consists of two carbon plates, the pores of which are charged with paraffin, suspended above a number of fragments of amalgamated zinc. A copper wire, covered with gutta-percha, except where immersed in the fragments of amalgamated zinc, passes down to the bottom of the cell where it is in contact with the zinc. The cells are seven inches deep by six inches wide, and contain about a quart of solution in addition to the plates. The absence or exhaustion of the zinc in any one cell in a battery is indicated by the appearance of a red insoluble chromic salt of mercury in a finely divided state, floating in the faulty cell. It is then necessary to drop in some pieces of zinc. The condition of the zinc may also be ascertained by feeling about the bottom of the cells with a stick. When not in use, the battery may be washed by simply charging the top reservoir with water, and leaving it to circulate through the cells in the usual manner, having previously withdrawn the exciting solution, which may be done by means of the tap or by a siphon.

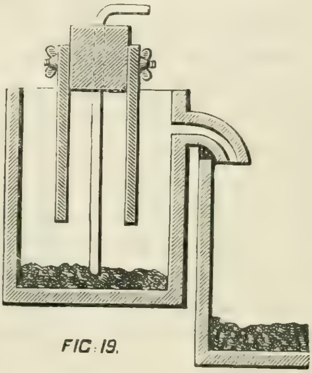

FIG. 19.

This battery was first employed for the purpose of utilising waste solutions from bichromate batteries, a quantity of which is thrown away before having been completely exhausted. This waste is unavoidable, in consequence of the impossibility of permitting such batteries, when employed for telegraphic purposes, to run until complete exhaustion of the solutions has been effected, therefore some valuable chemicals have to be sacrificed to ensure constancy in working. The fragments of zinc were also the remains of amalgamated zinc plates from the bichromate batteries, and the mercury which is employed for securing a good metallic connection is soon augmented by that remaining after the dissolution of the zinc.

This battery, which was regularly employed (1882) by the inventor, consisting of eighteen cells, worked nine permanent current Morse circuits, which previously required 250 telegraphic Daniell cells to produce the same effect, and was capable of working at least ten times the number of circuits mentioned. The potential of one cell is from 1·9 to 2 volts with strong solution, and the internal resistance varies from ·108 to ·170 of an ohm with cells of the size described. In order to test the constancy of the battery, a red heat was maintained in a platinum-iridium wire by the current for six weeks both day and night. A piece of platinum ribbon five inches long and one-eighth of an inch wide, with a resistance of ·42 ohm, cold, was heated to redness by a battery of five cells, and a glow still appeared in the platinum when the battery was reduced to two cells. Twelve electro-magnets were worked in multiple arc at the same time by two cells. Five cells are sufficient to magnetise a Thomson recorder. A battery of six cells, with a total electro-motive force of 12 volts and an internal resistance of ·84 of an ohm, cannot be replaced by less than seventy-one Daniell Batteries of ten cells each, connected in multiple arc, or for quantity.

The cost of working such a battery as this when waste solution cannot be obtained, and it is necessary to use freshly prepared bichromate solutions, is about 2½*d.* per cell per day, with a current constantly active in a Thomson recorder circuit, or a resistance of 1½ ohms per cell, but if only occasionally used, the same quantity of solution will last several weeks, being passed through the battery again and again until the absence of the characteristic warmth of colour of chromic acid indicates its complete exhaustion. To enable further comparison with other batteries it may be mentioned that the work Mr. F. Higgins' battery is capable of performing is 732,482 foot pounds, at a total cost of 1*s.* 6*d.*

A THREE FLUID CELL.—Professor F. W. Clarke states (1883) that a battery may be constructed of three non-miscible liquids. Layers of mercury, dilute sulphuric acid, and a solution of iodine in ether, are placed in a cell, and the uppermost and lowest layers are connected with insulated wires. Upon placing a galvanometer in circuit with the cell evidence of a fairly strong current of Electricity is obtained. Theoretically, the resistance of a three-liquid cell ought to diminish with rise of temperature, and Professor Clarke suggests that a combination of solid plates with the upper and lower liquids would probably yield a voltaic cell in which the internal resistance would be constant for varying temperatures.

DAVIES' BATTERY.—This battery was invented by Mr. J. H. Davies (patented 1883, No. 3,120), for the purpose of producing electric currents directly from the combustion, or combination with oxygen of carbon, or carbon compounds. Fig. 20 illustrates one of the simplest forms of this battery, and the method employed. A, is a vessel containing nitrate of potassium, which is melted by heat. In this is immersed a plate of carbon, C, having a wire attached to it, also a kind of cage, B, made of fine iron wire gauze, or netting of several thicknesses, and into which is carried the tube, D. The tube, D, may be of iron, glass, porcelain, or earthenware. The tube, D, and also the tube, F, pass through the stopper of another vessel, E, in which nitric acid is contained or generated, while to the outside end of F is connected a tube from any convenient reservoir of air. When air is forced through F it carries with it into D and B fumes of nitric acid, and this mixture finds its way through the meshes of the cage, B, into the melted nitrate of potassium. It will then be found that on connecting the wires from the carbon, which is the positive element, and the iron cage, which, in conjunction with the mixed gases, is the negative element, that a strong current of Electricity is produced. It is not altogether necessary that nitric acid fumes should be employed, for a good result may be obtained by simply passing air alone into D.

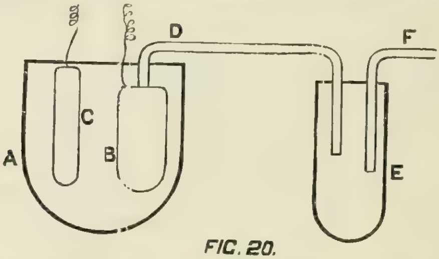

FIG. 20.

DR. OBACH'S CONSTANT CURRENT BATTERY.—Dr. Stapfer has called my attention to a battery invented by his friend Dr. Eugen Obach, which, from the ingenuity of its design, possesses some points of interest. A full account of this battery will be found in Dr. Ph. Carl's "Repertorium of Experimental Physics" (German Edition). Necessity in this case led to the invention, for while carrying out a series of experiments which led to the invention of Obach's "Tangent Galvanometer," Dr. Eugen Obach needed a battery that would furnish an intense and constant current of long duration, and was therefore led to design and construct the battery of which the accompanying figure (21) is an illustration.

The apparatus is arranged on the principle of the Bunsen Battery, viz.: a zinc element is placed in a solution of sulphuric acid in water, and a carbon element in nitric acid, and so arranged as to secure a continuous renewal of the liquids. The internal resistance of each element is stated to be, on an average, ·07 ohm, and the electromotive force is 2·09 volts; it furnishes therefore nearly 30 ampères on short circuit.

G G is a jar or bottle, 20 centimetres in height and 12·5 in diameter, placed in an inverted position over a proper support, and the bottom of which has been removed and replaced by a wooden cap covered with paraffin. The porous red earthenware vessel, P, which is held in place by a cork ring, is 23·5 centimetres in height and 6 in internal diameter. Great care should be exercised in the choice of the porous jar, for the proper working of the element depends much upon the quality of it. The porous pots employed by Dr. Obach were entirely saturated one minute after having been filled with water, which is a good proof of their porosity.

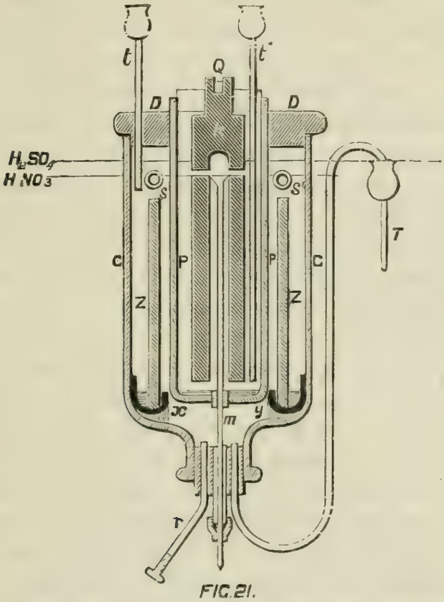

FIG.21.

The porous jar is closed with a cork saturated with paraffin and traversed by a carbon, K. This latter, which is retort carbon, is 22·5 centimetres long by 3·5 in diameter. It is perforated in its centre by an aperture 15 millimetres in diameter and 18 in length. In its upper part there is a series of small radiating holes; and a glass tube, M, whose upper extremity is funnel-shaped, reaches to the top of the fork of carbon and traverses the porous jar as well as the cork of the bottle or outer jar. The bottom of the porous pot is paraffined, as well as its upper part and the head of the carbon. Upon the bottom of the bottle or outer jar rests a gutta-percha ring, x y, in the form of a trough, filled with mercury, in which dips the lower portion of the zinc cylinder, which is 16 centimetres high, 6 millimetres thick, and weighs 2 kilogrammes. Through the cork at the lower portion of the bottle there pass two tubes, R and r, and through the wooden cover the two funnel tubes, t and t'. The former of these, t, terminates in the upper part of the zinc, while the latter, t', runs to the bottom of the porous jar.

The liquids circulate in the following manner:—The fresh nitric acid enters the porous jar near the bottom by means of the funnel tube, t', while the spent acid flows off through the radiating holes in the carbon into the central tube, m, and into a receptacle placed at the lower part. The dilute sulphuric acid solution enters, on the contrary, at the upper part through t, and, being rendered more dense by the formation of sulphate of zinc, flows through the siphon tube, R, into the tube, T. The surface of the liquids is nearly even, as is seen by the dotted lines in the figure, the sulphuric acid solution being at the highest level. S S' is a section of a glass tube bent into a circle and arranged at the upper part of the liquid, where there is most heat; this tube is traversed by a current of cold water for maintaining the liquid at a constant temperature. The tube, r, serves to empty the battery, and is always closed while the latter is in action.

All the connections are made by mercurial contacts. The zinc cylinder is connected to a sheet of copper enclosed in a glass tube which traverses the cover and dips into the mercury in the gutta-percha trough in which the zinc cylinder rests. The square end of the carbon is hollowed at Q, and this cavity is filled with mercury, which serves to establish communication with the external circuit.

The inventor has adopted means by which he can arrange two or more batteries in circuit when required; he has also devised a mercury commutator for allowing of the coupling of the elements as required. These are fully described in the article on this battery by Dr. Eugen Obach in Dr. Ph. Carl's journal "Repertorium für Experimental-Physik."

BENNETT'S IRON BATTERY.—Was invented by Mr. Alfred R. Bennett, M.S.T.E., and is manufactured by the "Electromotive Force Company," of Glasgow, in three sizes called respectively X, Y, and Z. Type X, the largest, is adapted for any purpose to which the corresponding size of Leclanché can be put, and possesses sufficient constancy for use on the busiest telegraph lines, and on local or relay circuits, and for working telephonic transmitters, medical and other coils, and electric bells and indicators in busy hotels or warehouses. Type Y, the middle size, is also applicable to all the above-named purposes in a modified degree, and is specially adapted for telephonic transmitters, for which purpose it gives most satisfactory results. Type Z, the smallest, is very useful for working domestic bells and indicators, fire alarms, etc., etc.

The object the inventor had in view was to produce a battery capable of performing at less cost the duties at present fulfilled by the Leclanché cell.

This battery may be made up in the following manner:—A porous cell, about seven inches in height, which is porous only for four inches from its bottom, and fitted with an air-tight stopper, contains a zinc rod which is brought through the stopper and terminates with a binding screw. The porous cell is placed in an iron cell about five inches in height, and of a like diameter, and is then packed firmly in with iron turnings. The porous cell is now filled with a caustic alkaline solution, the stopper replaced, and the battery is then ready for use. The tendency of the caustic alkalis to absorb carbonic acid from the air renders it desirable, although not absolutely necessary, to keep the porous cell tightly covered. While the iron cell and the turnings should, on the contrary, be exposed as freely to the air as possible, to facilitate the escape of the hydrogen. The caustic solution shall be made with distilled water when practicable to avoid the carbonic acid which exists in ordinary water. Common water may be used if a little newly-slacked lime is added to the solution before closing the cell, but for ordinary purposes common water may be used.

The idea of this combination was suggested by the fact that iron will not rust in solutions of the caustic alkalis, a fact probably due to the non-existence in such solutions of free oxygen and free carbonic acid. It was argued from this that if a plate of iron and a plate of zinc were immersed in such a solution, the iron not being attackable by the alkali, would be strongly electro-negative to the zinc. In practice this proved to be correct, and not only iron, but nickel and cobalt, as well as gold and silver, and the metals of the platinum group, were found to be practically as electro-negative to zinc as carbon itself. Silver is the most electro-negative of all the metals in these solutions. Owing to the rapid polarization of the simple iron plate it was found necessary to surround it with fragments of iron, which considerably modified this action.

This battery is not quite constant when working through an external resistance of 20 ohms, but the battery recovers its original electromotive force when allowed to rest with a rapidity sufficient to allow of its employment on the busiest telegraphic circuits, and for many other practical purposes. The E.M.F. varies slightly with the nature of the iron and the purity of the exciting salt employed; also with the degree to which the iron fractments are saturated or covered by the solution. The E.M.F. of the Daniell cell being taken as 1, and the Leclanché at its best, 1·30, the Bennett cell varies from 1·15 to 1·33; and the average may be taken at 1·23, or ·07 less than the best Leclanché; but the Bennett cell keeps up its E.M.F. much better than the Leclanché.

The chemical change which probably takes place in this iron battery is as follows (there being present when a solution of potassium hydroxide is used):—

$$Zn_2 + KHO + H_2O + Fe,$$

and the closing of the circuit produces first,

$$2\,ZnO + K + H_3 + Fe.$$

Thus, at the positive plate the oxygen of the potassium hydroxide and of the water is given off, and combines with two atoms of zinc to form zinc oxide. At the negative plate, the potassium and the hydrogen of the potassium hydroxide, and the hydrogen of the water are set free. The metallic potassium instantly decomposes an additional molecule of water in the negative portion of the cell, with the oxygen of which and with one of the free atoms of hydrogen it combines to re-form potassium hydroxide, leaving the four atoms of hydrogen due to the decompositon of water free.

This makes the final stage,

$$2\,ZnO + KHO + H_4 + Fe.$$

Thus the caustic solution is used up in the positive half of the battery and re-formed in the negative.

As regards the cost, this battery is probably the cheapest ever devised in proportion to its power and durability; and, when it is considered that the chief product of its action is zinc oxide, which is extensively used as a pigment, and as a substitute for white lead, this claim may, I think, be admitted. From a cell which had been ringing a bell continuously for one month 1,458 grains, or 3·04 oz. troy, were recovered, the zinc consumed being 1,170·7 grains, or 2·44 oz. troy. At the time of these experiments (1882) the price of zinc oxide ranged from 6*d.* to 1*s.* 6*d.* per lb., according to its degree of purity.

The iron shavings do not rust and are not changed in any way by the action of the battery, they therefore do not want renewing. The zinc may be of the commonest kind, as no local action of importance has been noticed unless the caustic used is very impure. Amalgamation may therefore be dispensed with.

It may be mentioned that a copper element in the place of the iron also answers well for a time, but a soluble salt of copper is gradually formed, which is precipitated upon, and stops the action of, the zinc.

(*To be continued.*)

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## THE TEETH OF MOLLUSCA.

*A Paper read before the Odonto-Chirurgical Society of Scotland.*

By Mr. John S. Amoore, L.D.S.Eng.

A little more than three years ago I read a Paper on the subject announced for to-night's consideration, before the Students' Society of the Dental Hospital of London, and much of what I have to say to-night may be found on referring to their Transactions. I have, however, been working at the subject for some time past, especially at the structure and development, which is entirely new to me, and have made several additional dissections, microscopic preparations, and diagrams, which will, I hope, illustrate more clearly the matter in hand. The subject is perhaps somewhat out of the usual line of those arranged for our discussion here, but I think it is very interesting to study the forms of teeth and Dental apparatus which we meet with in the lower grades of the animal scale, and to notice the points of resemblance, especially in their development, which they bear to the teeth of fishes, and through them to those with which we are more immediately concerned.

For a moment we might refresh our minds as to the position that the sub-kingdom Mollusca holds in the animal kingdom, and the nature of its contained classes. In the lowest group, the Protozoa, including the amœbæ and sponges, a definite mouth can scarcely be said to exist; in the next group, a distinct mouth is present, but no teeth; in the Annuloida, however, we find an isolated genus, possessing teeth very closely allied to those of the Vertebrates, and of which I hope to speak at a future time. Among the Annulosa we find teeth; but not so constantly nor I think so perfect as in the next one, our subject for to-night, the Mollusca, which is placed by zoologists at the head of the Invertebrates.*

Looking at their structure as a class, we find them animals with a soft body enclosed in a muscular skin, and usually protected with a shell of some description, although in some specimens, such as the common garden slug and the cuttle-fish, the shell is internal, and, in the latter of these, is familiar to us as Dentists in the form of "cuttle-bone." They have all a heart, a vascular and nervous system, and special organs appropriated to the five senses; and the highest class, Cephalopoda, possess vessels corresponding to the Aorta and Vena Cava; they have representatives of the kidneys, as well as large and well developed eyes; the greatest mass of nerve matter, as is usual in this sub-kingdom, surrounds the gullet, and is protected by a cartilaginous plate, which sends out processes over the eyes, while the auditory sacs are enclosed in its substance, a foreshadowing of the cranium of the Vertebrata. Most of the classes contain members very familiar to us except the Pteropoda, which constitute a group of delicate, fairy-like creatures, abounding in northern latitudes, where they afford food for the whale, and are only met with by ordinary folk in our museums.

The lowest class we can dismiss without further trouble, as they do not possess any Dental apparatus whatever; the other four are, however, possessed of an odontophore or tooth bearer. This is a ribbon-like strip, varying in length in the different genera, in the longest about an inch or an inch-and-a-half, and in the smallest extremely minute. Throughout its entire length it carries rows of hard glossy teeth, arranged in the different species in eminently characteristic patterns; at the anterior end the teeth will be seen to be blunted and broken by wear, while at the other extremity they are colourless but perfect as to shape, as they emerge from the developing sac in which the posterior end is lodged.

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* Nicholsons' Zoology.

The odontophore consists essentially of four parts—the skeleton, the subradular membrane, the radula, and the extrinsic and intrinsic muscles. The skeleton consists of two cartilaginous cushions, well shown in the limpet; these are grooved in the middle line, in which is placed the subradular membrane, resting upon and covering them in part, and continued throughout the entire length of the odontophore; this in turn supports radula bearing the teeth. There are two sets of muscles to work this apparatus, and the *modus operandi* is simple. The intrinsic muscles connect the radula with these cushions, and are attached some to the upper and some to the under surfaces, and it is evident that, by the alternate contraction of these two sets of muscles, the radula will be caused to glide backward and forward over the ends of these cushions, and thus serve to rasp anything with which it is brought into contact; and as the teeth are all arranged pointing toward the gullet, the food thus rasped off is conveyed into the mouth. The extrinsic muscles, well shown in the whelk, connect the odontophore to the side of the head, and thus serve to protrude or withdraw the whole apparatus. The radula itself usually forms a triple band, a central strip or rachis, and two lateral tracts or pleuræ, and in most works on molluscan literature the Dental formula is given for the different genera; thus, if there were two teeth on the central strip and five on either side on the lateral tracts, the formula would be given as 5.2.5. The rachis rarely carries many teeth, but upon the pleuræ in some species, such as the common "Top" (*Trochus cinerarius*), the teeth seem to be almost numberless.

A capital opportunity for observing the method in which the odontophore is used is easily obtained. If a bell glass be filled with water, and placed in the sunlight, the sides rapidly become green, owing to a growth of incipient vegetation. This is a favourite pabulum for the water snail common to our ponds and ditches, and if one be introduced it will soon crawl up the sides of the glass, and then, if closely watched, the mouth will be seen to open, the jaws separate, the odontophore is protruded, the teeth glisten as they pass over the glass, and the radula, with its load of confervœ, is withdrawn, and the mouth closed again, the whole operation bearly occupying two or three seconds. After advancing slightly, the process is again repeated, and the observer cannot fail to be struck by the rapidity and neatness with which it is done.

It would be well to take a few typical specimens for closer examination, and from the lower class we would take the common whelk, and having divested it of its shell, it must be pinned out on a weighted piece of cork below water. One of the first objects which strikes the eye is, if it is protruded, a long muscular, flexible tube of about an inch or an inch-and-a-half in length, with an opening at its free end, which constitutes the mouth. When the animal is not feeding, the whole of this tube is withdrawn into the shell, through the action of the extrinsic muscles, which reverse the lower half of the tube, and thus draw the anterior half completely within it, telescope fashion. On laying open the interior of this tube, it will be seen to contain the gullet, the odontophore and its muscles, and the duct of the salivary glands, while at its base are seen the salivary glands themselves, two fair-sized yellowish bodies; from these the ducts may be traced passing down side by side with the œsophagus through the ring of nervous ganglia to the mouth, which they enter and open in close proximity to the teeth. The ducts, which I have dissected out from an average sized specimen, measure some 3½ inches; when *in situ*, however, they are more or less wavy in their course, to accommodate themselves to the movements of the animal, and do not therefore appear so long. The teeth need not be described, as they can be seen under the microscope. This genus demonstrates very clearly how effectual are the powers of the odontophore; settling usually upon some bivalve shell, such as the common mussel, they drill a small hole through the shell close to the hinge, evenly and neatly, as though it were done with a burring engine. I have often in my shore rambles found the shells thus drilled, and on one occasion remember seeing it in course of operation. It is by no means a newly-acquired habit, as many specimens found among fossil beds of shells bear complete evidence as to the antiquity of this cannibalistic propensity.

Passing away from this group to the Nudibranchs—those popularly known as sea lemons and sea slugs, we come to a series of creatures, many of whom, unlike their terrestial representatives, are tinted with most exquisite colours and beautiful in every respect. Very many of them are armed with horny mandibles to aid in prehension, and in one of the Eolidæ they seem to resemble a pair of nutcrackers with double dentated edges, the handles being embedded in muscular tissue. Some species are not, however, contented with this, but have, in addition to the odontophore, a prehensile collar armed with teeth, while others, still less easily satisfied, have the stomach armed with gastric teeth.

From the next class, the slugs and snails common to our gardens may be taken as typical examples. The odontophore is shorter and broader, and the teeth blunter than in most of the marine molluscs;

at the same time they are more numerous. The great slug has been calculated to have 160 rows of teeth, with 180 in each row, making a moderate total of 28,000, but a comparatively small proportion of these are in use at one time. If a snail be dissected from the ventral surface, as soon as the muscular skin is removed the alimentary canal will be laid bare. At its commencement is seen the mouth, with its small horny mandible, and leading away from it the œsophagus, which, passing down through the ring of nerve ganglia, gradually widens into a kind of crop, closely embraced by the salivary glands, from which, as described in the whelk, the ducts may be traced to the mouth. I have examined the glands of one or two species microscopically; they seem to be of very simple construction, and to consist of clusters of largish round cells with single dark looking nuclei, the individual cells being loosely bound together with connective tissue. The clusters of cells constituting the lobes of the gland are also loosely joined, and are easily pressed apart betwen the cover glass and slide. These cells may be seen lining the ducts, forming, indeed, its walls, but the branches of the duct are not so readily visible. They take the carmine stain fairly well, after the mucus has been removed by immersion in spirit, and may be mounted in glycerine.

The next class, the Pteropoda, I will pass over, never having had any opportunity of examining them. They have, according to Woodward, a very simple Dental formula, but possess, in addition, a muscular gizzard, armed with gastric teeth.

In the highest class, the Cephalopoda, the Dental apparatus which we have been considering as a microscopic structure is distinctly appreciable, and in very large specimens even formidable. They are all armed with a horny mandible, partly calcareous in the nautili, strongly resembling a parrot's beak in shape; the one exhibited with about a half-inch gape was taken from an ordinary sized specimen with arms, measuring about six or eight inches, and when we remember that the existence of individuals having arms at least seven feet in length has been perfectly authenticated, we can form an estimate as to what the size and character of their jaws would be. The structure of the odontophore is essentially the same as in the other Mollusca, and the teeth are larger and stronger, though as a rule not sufficiently large to be clearly seen without the aid of a magnifying glass. Those upon the rachis very strongly resemble those of some of the shark in shape.

The molluscan teeth appear to be perfectly homogeneous in structure; that is, there is no variety of tissue as in those of the Vertebrata, but when examined at a very early stage of their development a number of very fine rods may be traced out, about the size and general appearance of enamel prisms, though there is no other resemblance, these teeth being entirely composed of chitinous material. These chitinous rods or striæ run in lines transverse to the long axis of the tooth, from one side to the other, and probably encircling it, and suggest that the cusp of the tooth is formed first, but judging from general appearances, this does not seem likely.

If a limpet be dissected it will be seen that the radula is of a remarkable length, exceeding that of the greater diameter of the shell. It lies doubled upon itself in the cavity of the body, the part in use, however, probably not exceeding more than $\frac{1}{8}$ or $\frac{1}{6}$ of an inch in length, while an inch, or the greater part of the remainder, is within the developing sac. This latter part is protected from the cavity of the body by a reflection of the mucous membrane, from the mouth and the odontophoral cartilages, while inside this again is another membrane which envelopes the radula closely, except at the end, where it enlarges into a bilobed sac. I am not certain as to distinctness of these two membranes, though they appear to be independent. The bilobed inner sac is, however, unmistakable, and if placed upon a slide and the cover class gently pressed upon it, it bursts, and a watery-looking fluid escapes, containing dark granular looking material suspended in it. The bursting of the sac leaves the developing teeth exposed lying upon the radula, from which they are developed, and where they are seen as delicate, flattened, colourless cells, some of them showing in outline the nature of the teeth they are to become. A few rows further down they are completely formed so far as shape is concerned, but still soft and colourless, and exhibiting clearly the rods or striæ above referred to. If the whole radula, after being freed from the membrane, is passed through the field of the microscope, the teeth will be seen to gradually assume a brownish orange tint, which becomes darker and darker as the teeth become harder and more perfect, till, towards the buccal extremity, the cusps are seen perfectly black. Near the mouth the teeth pass from beneath the membrane composing the developing sac, and enter the cavity of the mouth, or rather lie upon the odontophoral cartilages, covered only by the buccal mucous membrane in the same way that the teeth of sharks and rays are erupted in successive rows from beneath the fold of mucous membrane at the base of the jaw, where they are developed.

The only literature that I can find bearing upon this part of the subject is a Paper read by Professor Huxley before the Royal Society of London, where he treats of the Anatomy of the Doris,* one of the "sea lemons," popularly so called. In them the radula is much shorter than in the limpet, and tongue shaped, and the developing sac in which the posterior part is lodged, resembles a tube somewhat flattened laterally. Professor Huxley says:—" If we make a transverse section of the part of the tube which projects from behind the buccal mass and examine it, we find in the centre a fleshy, wedge-shaped lamina, bounded on both sides by two parallel membranes, between which are developed the teeth. If another section be made lower down, the lamina, before attached to the tube merely at the apex of the wedge, is now continuous with the muscular lining of the sac along the median line. Along each side of this attachment is found an enlargement of the mucous membrane, which would seem to be of a glandular nature, and most probably from this the parallel membranes before mentioned originate. Upon the outer of these membranes, which has received the name of the dentigerous layer, the teeth may be discovered at a very early period in their growth as rows of elongated, and attenuated, soft, and colourless cells. Two or three rows further on they may be observed to have attained the size and form of the mature teeth, still, however, remaining soft and cell-like; the next rows are harder, and are slightly tinted with an orange colour, while still further on, at the mouth of the sac, they have attained all the characteristics of perfect teeth, and are hard and highly polished. The space between the two parallel membranes is packed with a soft matter derived from the inner layer, and which, when placed in spirit, becomes flocculent; in this matter the teeth are embedded."

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* Anatomy of Doris.—Phil. Tran. '52.

I have only been able to procure one specimen of the Doris (*D. tuberculata*), but most of the appearances which Professor Huxley describes are easily determined, except the flocculent packing matter, but as the subject had been in spirit for a long time, it is perhaps no less than might have been expected. There was, however, the same granular deposit upon the walls of the tube which was referred to as being present in the fluid contents of the developing sac of the limpet. The membranes will also correspond, the outer one upon which the teeth are developed forming the radula, while the inner one serves to enclose the fluid in which the developing teeth are embedded.

There appears, however, to be nothing in the limpet to correspond to the " fleshy wedge-shaped lamina," nor to the " enlargement of the mucous membrane of a glandular nature at its base," neither do they seem to be present in the snail, where the developing sac and odontophore is somewhat similar externally to that of the Doris. I have not, however, examined any other of the nudibranch molluscs with a view of determining this, but probably the exact method of development is confined to this group, the presence of the parallel membranes being apparently the necessary element for their production. Professor Huxley compares them to the pulp and enamel membranes of the vertebrates; if the pulp and enamel membranes represent the odontoblast layer and the internal epithelium of the enamel organ, the analogy is scarcely borne out, but this Paper referred to was written some years ago, before the development of the teeth was as well understood as it is now; and without attempting to draw any close comparisons between classes of animals so distantly removed from one another, I think that no one would doubt the relationship of these molluscan teeth to those of the sharks and rays in the fishes. Shape, of course, cannot be taken into consideration, but the method of development of the teeth in this sac, lined with a continuation of the mucous membrane of the mouth, the contained membranes with their rows of denticles, the advance from beneath this membrane into the cavity of the mouth, or, as we should say, their eruption, all present analogies which cannot, I think, in justice be overlooked.

## FERMENTATION IN THE HUMAN MOUTH; ITS RELATION TO CARIES OF THE TEETH.

By Dr. W. D. Miller, Berlin.

During the last two years I have stated at different times and places, as the result of many experiments, that "the first stage of Dental Caries consists in a decalcification of the tissue of the teeth by acids, which are for the greater part generated in the mouth by fermentation." The object of the investigations described in this and the following papers is to determine this ferment, and the conditions essential to its action. I shall seek in what follows to present no views which are not the legitimate and necessary results of rigid and exact experiment, and I shall give in detail a description of each series of experiments, in order that every one may have an opportunity to judge of the accuracy of the work and the justice of the conclusions drawn from it.

It is, nevertheless, with some hesitancy that I venture to present before the Dental Profession the results of my last six months' labour, having learned by experience the almost endless number of agents which combine to vitiate such a series of experiments as that which I am about to offer, and the exceeding great care which is necessary in excluding or eliminating all irrelevant factors.

If, therefore, I have been guilty of any oversight, or failed to take all possible precautions to guard against error, I hope that some one will kindly show me where I have gone astray, and put me in the right course again.

The larger apparatus necessary for these experiments are:

1. A large double-walled incubator, with gas regulator for maintaining any desired constant temperature.

2. A Koch sterilizer.

3. A damp chamber.

4. A drying oven for sterilizing instruments, glass vessels, etc., at a temperature of one hundred and fifty degrees Centigrade.

5. A good microscope, with either water or oil immersion.

It is not necessary to mention the smaller instruments, glass vessels, etc , etc., nor the apparatus necessary for making a chemical analysis of the products of the fermentation ; these are sufficiently familiar to every one.

To avoid repetition, I will say here that *all* vessels and instruments used in the culture experiments were purified in the flame of a Bunsen burner, when practicable, otherwise by exposing for fifteen minutes in the drying oven to a temperature of one hundred and fifty to one hundred and sixty degrees Centigrade (three hundred and two to three hundred and twenty degrees Fahrenheit), and that all substances used as culture substrata were sterilized four times by exposure, at intervals of twelve hours, for half an hour, to steam at one hundred degrees Centigrade, in a Koch sterilizer. Furthermore, all infections from carious dentine were made as follows :—The cavity of a freshly extracted carious tooth is cleared of food, and carefully brushed over with a pledget of cotton dipped in carbolic acid (ninety per cent.). The acid is then thoroughly absorbed by means of bibulous paper, and layer after layer of the soft dentine removed with a repeatedly purified instrument, until the deeper parts are reached ; then, a portion of the clean soft dentine, scarcely as large as a pin-head is removed, and quickly brought into or upon the culture medium.

Infections from the mouth were made by scratching upon the surface of the mucous membrane of the cheek, or the margin of the gum, with the end of a clean platinum wire, and then dipping it into the culture medium. The materials used for culture were :

No. 1. Sterilized saliva, 50·0 ; sugar, 1·0 ; starch, 0·5.

No. 2. Sterilized milk.

No. 3. Decoction of malt, 50·0 ; sugar, 1·0.

The malt decoction is made by boiling, with slight evaporation, 20·0 dry malt with 120·0 water for ten minutes, and filtering.

No. 4. Sterilized saliva, 50·0; water, 50·0; starch, 20·0; sugar, 2·0.

The starch is added to the cold solution of water and saliva, and stirred until it becomes evenly divided throughout the solution ; it is then poured into shallow glass vessels with glass covers, and put into the sterilizer for complete sterilization ; it there congeals and forms a solid mass, upon the surface of which the infections may be made. It possesses all the advantages of gelatine, with one great additional one, in that it does not liquify at blood temperature.

No. 5. Decoction of malt, 100·0; sugar, 2·0; starch, 20·0. Prepared in the same way as No. 4.

No. 6. Beef extract, 2·0; water, 100·0.

No. 7. Water, 100·0; beef extract, 2·0; sugar, 2·0.

No. 8. Fresh baked potato, cut into slices one half inch thick, with a clean knife.

Other substances were used, but need not be considered here. Additional sugar is not absolutely necessary where malt is used, though I have, so far, obtained better results by adding a small quantity. The kind of sugar is immaterial, provided it be fermentable; even cane sugar, though not directly fermentable, is converted into a fermentable variety in the culture. Where small quantities of any culture material were used the cultures were kept in the damp chamber to prevent their drying up or becoming too concentrated by evaporation. All cultures were made under a temperature of thirty-six to thirty-eight degrees Centigrade.

We will begin with the fundamental experiments.

Exp. 1. Fresh saliva is mixed with sugar or starch, one to forty, and kept at blood temperature. It invariably becomes acid in four to five hours. But some one, no doubt, will say that this is a result of no consequence, because the experiment was not made within the oral cavity. For his personal benefit we give the following:

Exp. 2. A glass tube two c. m. long and three m. m. wide, is filled with starch, sterilized, and fastened to a molar tooth in the mouth on going to bed; next morning the contents of the tube will have a strong acid reaction. A cavity in a tooth, or a piece of linen, which may be saturated with a solution of starch, will answer the purpose as well as the glass tube. That the acid is the same in each case will be further established below.

Exp. 3. The mixture of saliva with starch or sugar is kept for a half-hour in the sterilizer at one hundred degrees Centigrade, and then placed in the incubator. It does not become sour in four nor in twenty-four hours—in fact, not at all. We conclude that the ferment is rendered inactive by a temperature of one hundred degrees Centigrade.

Exp. 4. The starch is heated to one hundred and fifty degrees Centigrade before mixing with the saliva; the solution still becomes sour. Conclusion: the ferment exists, not in the starch, but in the saliva.

We have now to determine the question: Is it an organized ferment (fungi), or is it an unorganized ferment (ptyaline)?

This question is determined by the following experiments:

Exp. 5. From six to eight grams of saliva are agitated in a test-tube with as much sulphuric ether as it will take up, starch added, and the whole put in the incubator. On examination, after a few hours, we will find sugar in the solution, but no acid: in other words, the acid-forming ferment has been rendered inactive, but the unorganized, sugar-forming ferment, not.

Exp. 6. Instead of ether, enough carbolic acid is added to make the solution one-half per cent. strong; the result is the same. These two experiments show that the ptyaline of the saliva (which was not injured by the presence of the ether or the carbolic acid, as proved by the fact that it retained its diastatic action), is not the cause of the acid reaction.

Exp. 7. According to Paschutin, ptyaline is devitalized by exposure, twenty minutes, to a temperature of sixty-seven degrees Centigrade. Organized ferments could not be killed by the same means. We accordingly subject a mixture of saliva and grape-sugar to the given temperature for twenty minutes. We thereby destroy the ptyaline; the mixture, nevertheless, becomes sour if allowed to stand in the incubator for twenty hours.

This experiment confirms the result of experiments 5 and 6, and we begin to suspect that we have to deal with an organized ferment. This supposition is confirmed by the following experiment:

Exp. 8. Six to eight drops of a perfectly sterilized solution of sugar in saliva (1·40), in a miniature test-tube with cotton cork, are infected from the mouth, or with carious dentine, as described above; in twenty-four hours the solution will be acid; with a fraction of a drop of this solution a second tube is infected; it will likewise become acid; from this a third, etc., etc.; each becomes acid in turn, while the control tube (containing the same solution, not infected), remains neutral.

The conclusion is plain, that we have to do with a ferment which is capable of reproducing itself; in other words, an organized ferment. It therefore becomes evident that not only free in the mouth, but in the deeper parts of carious dentine, we have a fungus which is capable of producing an acid reaction in characteristic substrata.

Exp. 9. Each of thirty small tubes were furnished with eight drops of solution No. 1, and each of thirty other tubes with as many drops of solution No. 3, and all were sterilized. Twenty-four were then infected from the mouth, twenty-four with carious dentine, and twelve were left as controls.

In twenty-four hours all forty-eight of the infected solutions were acid, while the twelve controls remained neutral.

Exp. 10. Make a solution of 40·0 of saliva and 1·0 of starch; put equal portions in two flasks, *a* and *b*, and cover the surface of the solution in *a* with a layer of pure oil to prevent the free access of air, or:

Exp. 11. Place flask *a* in an air-tight bottle containing a fresh alkaline solution of pyrogallic acid (which abstracts the oxygen from the air), or:

Exp. 12. Exhaust flask *a* by means of the air-pump, so as to produce a tolerably complete vacuum. The quantity of acid produced in *a* will be, on an average, the same as that produced in *b*.

We conclude from experiments 8, 9, and 10 that the fungi in question is independent of the free access of air or oxygen for its development and characteristic action, a conclusion which would exclude the fungus of vinegar (*mycoderma aceti*), and which is of the utmost practical importance, since it signifies that this fungus can develop and perform its work deep in the dentinal tubules, or underfillings, provided the necessary materials are furnished it.

Exp. 13. Place a piece of carious dentine upon the surface of the culture material described in number 4, 5, or 6; in twelve hours the dentine will be surrounded by a white ring, from four to eight m. m. in diameter; the material within this ring will be partially liquified, and have an acid reaction. The same result follows when the infection is made from the mouth.

Exp. 14. Produce 10·0 of saliva by chewing a sterilized quill toothpick, add 0·5 starch or sugar, and place in the incubator. Then give the oral cavity a most thorough cleansing with pure water, using toothpick, brush and floss, the object being to free the mouth from micro-organisms as completely as possible. Then produce again 10·0 saliva, add 0·5 starch or sugar, and put in the incubator. The amount of acid produced in a given time will, in the latter case, be often as low as one-fourth of that in the former. Conclusion: By thoroughly cleansing the mouth we no doubt remove the greater portion of the fungi; hence the small amount of acid produced. By using strong antiseptics, or by repeatedly filtering the saliva, we may reduce the amount of acid produced in twenty-four hours almost to ·0. An experiment yet to be made is to take the saliva direct from the gland before it becomes infected with the organisms of the mouth; it should not then become sour when mixed with starch and allowed to stand at blood temperature. In every case a careful microscopic examination of the cultures was made, revealing the constant presence of a fungus, chiefly in the form of diplococci, either single or in chains, less often in form of bacteria, bacilli, or even threads.

Sometimes all these forms are found on a single thread, thus proving what I have already demonstrated for *Leptothrix buccalis* and *Leptothrix gigantea* (Miller), the genetic connection of these different forms. The particular form in which the fungus occurs depends somewhat upon the culture medium, as well as upon the age of the culture. By using a glass tube as culture vessel we may demonstrate that whether the culture is made in the mouth or out of it, under similar conditions the fungus is the same. The fungus is not capable of producing an acid reaction of all substances in which it may vegetate. A luxuriant growth may be obtained in beef extract, but no acid is produced, unless sugar is present.

It is only from carbo-hydrates (especially sugar) that it appears to be able to produce acid in any considerable quantity, or at all. This question, however, as well as the morphology, physiology, development and life-conditions of the fungus, will receive consideration in a separate number.

We have, then, a micro-organism which agrees morphologically with the *Bacterium acidi lactici*, and which, without the presence of oxygen, produces acid from sugar, so that we would probably not be far from right if we were to say that the organism in question is simply the fungus of lactic acid. We will, however, reserve our decision for the following number, where the analysis of the product of the fermentation will be given, that being the one *sure* method for determining the species of any ferment bacterium.

In all cultures it is of course essential that the culture-substratum be neutral when the inoculation is made ; should it be acid it must be neutralized. This is best accomplished by very carefully adding the carbonate of sodium. Without this precaution it would be somewhat difficult to determine whether acid had been produced by the action of the fungus or not.

In the light of these experiments the thorough decalcification of the tooth substance in caries is easily accounted for. The saliva is, no doubt, always, particularly in mouths of uncleanly persons, impregnated with sugar, either taken directly into the mouth, or formed there by the action of the ptyaline of the saliva upon starch. The question of the presumable diastatic action, as well as of a presumable inverting power on the part of the organisms themselves, will be considered in the chapter on Physiology.

Wherever this stagnates between the teeth, in fissures, etc., etc., especially during sleep, it *must* become acid. When a portion of the dentine has become decalcified, it, as is well known, takes up the liquids of the mouth and the fungi with them like a sponge, and the fungi, being independent of the free access of air, go on producing acid within the dentinal tubules. As each layer of dentine becomes softened in turn, the micro-organisms *follow after*, continually producing new acid. Hereby the zone of softened, non-infected dentine, is readily understood. The production of acid is entirely independent of the reaction of the saliva as it enters the mouth, hence the uselessness of "testing the saliva" for acid. That the liquid squeezed out of the tubules of *decaying* dentine has an acid reaction every Dentist in

America who has a piece of blue litmus paper and is not colour blind, can easily prove for himself.

The result of experiment 6 plainly shows one cause of the good effects which the Profession has seen from the use of carbolic acid.

The fact that a pure culture was obtained in most cases by the first inoculation, seems to indicate that the fungus exists in a state of tolerable purity in the deeper parts of the carious dentine. This question will, however, receive consideration later. The action of the fungus upon substances which contain no carbo-hydrates will also be considered under Physiology.

The Editorial remarks upon this article are as follows:

We need not urge every physiologist among the readers of the *Independent Practitioner* to carefully read Dr. Miller's Papers on "Fermentation in the Human Mouth." There are some new and interesting facts given this month, that for the first time harmonize known conditions with demonstrated physiological law. The existence of sugar at nearly all times in the oral cavity naturally follows from the presence of starch and the diastatic action of ptyaline, and its conversion into an acid by means of a proper ferment is a natural consequence. That ferment Dr. Miller seems to have demonstrated. Softened dentine will, as he says, take up the sugar with the ferment as would a sponge, and within the mass the acid conversion will go on, with the possible effect of extending the decalcification of tooth tissue. It remains for the succeeding Papers to determine the action of this acid upon dentine, and the analysis of it, and the chapter on the physiology of the mouth will be looked for with interest.

The supporters of the acid theory of caries have always claimed that the testing of the oral secretions is no sure indication of the reaction on the teeth, because the acids were most energetic while "nascent." Dr. Miller gives a more reasonable explanation of the puerility of the usual saliva tests. It would be gratifying to know whether any such fungus may be found in the mouths of such animals as are not subject to tooth caries, but whose food is, to a greater or less extent, amylaceous.

The record of experiments in this number shows them to have been conducted with faithful care as to details, and in a purely scientific manner, and they are related with a directness and simplicity that reminds one strongly of Tyndall. We are of the opinion that, from the time of the publication of this series of Papers, the study of Oral Physiology will proceed in a different direction, and that these discoveries will mark a new era in Dental Etiology. For the first time we have a definitely determined point of departure, and an established law of action under which we may with some hope of certainty trace the progress of Dental diseases.—*Independent Practitioner.*

# DENTITION AS INDICATIVE OF THE AGE OF THE ANIMALS OF THE FARM.

By Prof. G. T. BROWN,
VETERINARY DEPARTMENT OF THE PRIVY COUNCIL.

*From the "Journal of the Royal Agricultural Society of England."*

*(Continued from page* 30.*)*

A PRACTICAL horseman would perhaps feel amused at the idea of the possibility of a yearling being taken for a five-year-old, or a two-year-old for a six; but in the case of rough forest-ponies, in which the aspect of colthood is quickly lost, such mistakes have occurred; and it is, therefore, not out of place to suggest that care should be taken to discriminate between the temporary incisors, and, if necessary, to refer to the molar teeth, in order to avoid such embarrassing blunders.

Under ordinary circumstances it will be more frequently necessary to distinguish between a yearling and a two-year-old than between one-year-old and five, and it fortunately happens that at the age of two years another molar, the fifth in situation, is in the mouth, and may be at once distinguished by its recent appearance. Soon after eighteen months the fifth molar begins to protrude through the gum, and by the termination of the second year is level with the other molars, as shown in Fig. 8, p. 125, so that any doubt which may remain after an inspection of the incisors may be settled by reference to the condition of the molars.

It will be observed in the figure just referred to that the surfaces of four molars are worn level, while the points of the new tooth, the fifth in position, are rounded, excepting a small portion at the inner side of the tooth, which shows the effects of attrition, but only to a slight extent.

The incisor teeth at two years of age have their tables perfectly formed, as a rule; but, in some instances, the corner teeth, although they have lost their shell-like character, still have a portion of the posterior edge untouched, as shown in the following illustration (Fig. 9) of the mouth of a two-year-old filly.

Between two and three years of age the central temporary incisors of the horse are changed for permanent teeth, and the different phases of the change are sufficiently well defined to assist the examiner in deciding whether the animal is two years off or coming three years.

At two years off, or two years and a quarter, there will be evident signs of the shedding of the upper central incisors. The gum at the necks of the teeth is somewhat sunken, and the colour is rather deeper than in other parts. Very soon a red line appears in this position, and it is evident that one or both of the temporary teeth are only held in their places by a small portion of the fang which has not yet been absorbed. At two years and a half the permanent teeth will

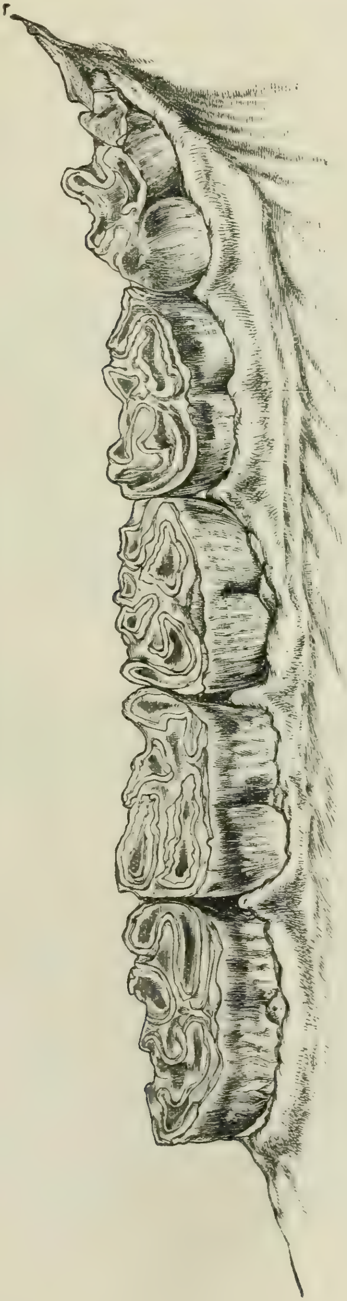
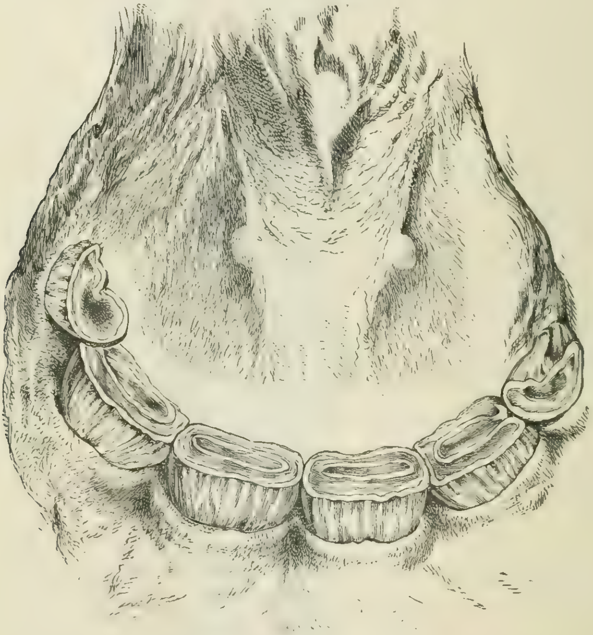


Fig. 8.—*Molars of Colt at two years.*

generally be in the mouth. Perhaps one temporary central incisor may yet remain; but even in that case the state of the permanent teeth will be sufficient evidence of the animal's age.

The mouth of the horse at two years and a half has a very characteristic appearance, especially when viewed in the front, by separating the lips. The four permanent central incisors are seen in position about half grown, with deep cavities or infundibula extending across each tooth, presenting a striking contrast to the worn temporary teeth on each side of them. The new permanent teeth at this age are not more than halfway up, and there is consequently a considerable space between the upper and lower teeth when the temporary teeth are in apposition.

Fig. 9.—*Incisors of Cart-filly at two years.*

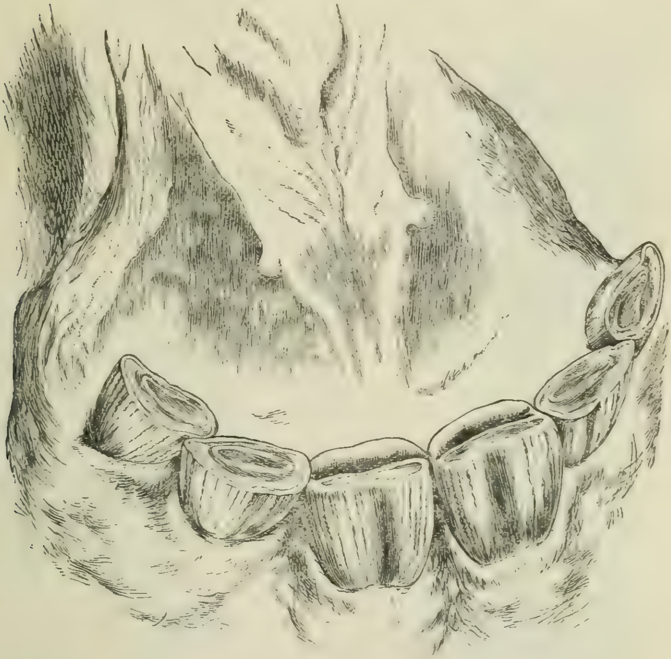


When the horse has reached the age of two years and nine months the four permanent incisors will be in actual contact—at least, in regard to their anterior edges when the mouth is closed; but, on examining the tables, it is apparent that no wear has taken place, and the posterior edges of the teeth are not yet level with the anterior.

At three years old the central permanent incisors are fully developed, and the anterior edges show a narrow line of worn surface. The posterior edges are level with the anterior, but are not worn to the same extent.

These appearances are shown in the next illustration (Fig. 10),

Fig. 10.—*Incisors of Horse at three years.*



which was taken from the mouth of a colt at the completion of the third year.

During the development of the central permanent incisors in the course of the third year an important change is going on in the first and second molars, the fangs of which are gradually absorbed as the permanent teeth push their way up underneath them.

At two years and a half old one or two of the permanent molars may be in the mouth. Sometimes the second in position is cut before the first, and a careful examination will show that the crowns of the first and second temporary molars which yet remain are only retained in their position by a slight attachment to the gum, and very little force is required to dislodge them.

The succeeding drawing (Fig. 11, p. 128) shows the condition of the molar teeth soon after two years and a half. A permanent tooth, the first in position, is seen occupying the place of the temporary molar which has fallen, and the second permanent tooth is seen pushing its way up under the second temporary molar, which still remains *in situ*. The fifth molar, which was up at two years old, is fully developed, and is quite clear from the angle of the jaw.

At three years old the first and second permanent molars are well up, and the top and bottom teeth are in contact when the mouth is

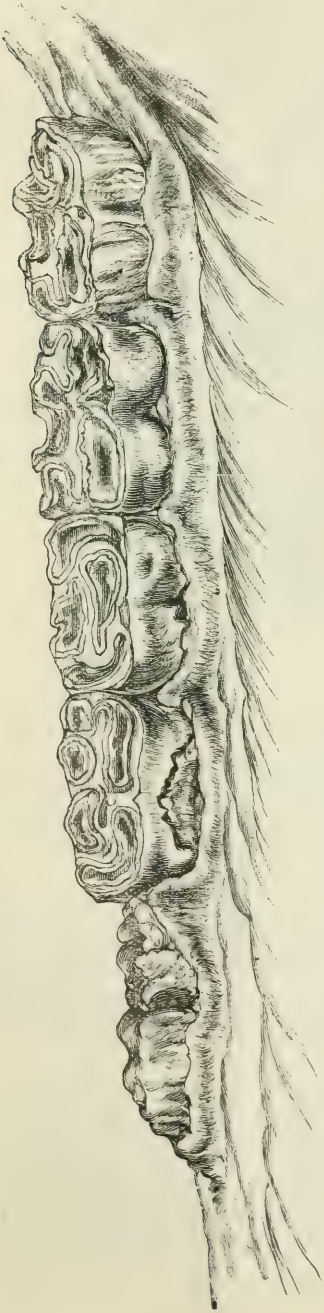


Fig. 11.—*Molars of Horse at two years and seven months.*

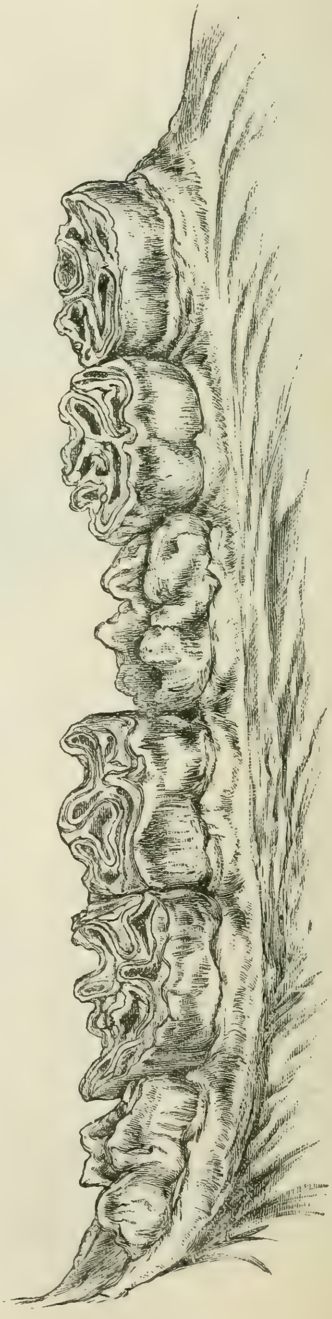


Fig. 12.—*Molars of Horse at three years and eight months.*

closed; but the teeth are distinguished by the recent appearance which they present in comparison with the worn surfaces of the teeth immediately behind them.

From the completion of the third year to the termination of the fourth year the changes which have been described in reference to the central incisors and the first and second molars occur in the lateral incisors, and the third and sixth molar.

At three years off the same condition of the gum which was described in respect of the upper central temporary incisors, now appears at the necks of the lower lateral temporary incisors. At three years and a-half some or perhaps all four of the permanent lateral incisors are in the mouth, and soon afterwards the fourth and sixth permanent molars are cut, as shown in the drawing (Fig. 12, p. 128).

No difficulty would be experienced in distinguishing the recent molars in the condition represented in the illustration. The first and second, and the fourth and fifth molars show considerable wear, while the new teeth present rounded points on their surfaces, and are not nearly level with the other teeth. One or two of the most projecting points of the sixth molars show the effects of attrition; but these teeth at the age of three years and a-half have their posterior points close to the angle of the jaw and still covered with the gum.

(*To be continued.*)

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## ODONTOLOGICAL SOCIETY.

THE Ordinary Monthly Meeting of this Society was held at 40, Leicester Square, on Monday evening, February 4th, the Chair being occupied by Mr. J. SMITH TURNER, the newly-elected President.

Mr. F. CANTON mentioned a case of unusual hæmorrhage after the attempted extraction of a tooth. The case was an exceptional one, inasmuch as the crown of the tooth only was removed, and the profuse bleeding from the pulp continued for such a long time. With the extraction of the tooth the hæmorrhage ceased.

Mr. G. PARKINSON showed a sequestrum from the lower jaw of a boy, aged nine years.

Mr. W. E. HARDING lately removed a large sequestrum which had been exfoliated from a lower jaw, owing to injury during the extraction of a wisdom tooth. Loss of function of the inferior Dental nerve had followed, and, in the opinion of several members present, the prospect of the patient regaining sensibility in the injured nerve was very doubtful.

Dr. ST. GEORGE ELLIOTT explained the result of his experiments with some of the best known amalgams now in the market, showing in tabular form the amount of shrinkage, the specific gravity, and the hardness, of fourteen different amalgams as they were mixed dry, soft, or of medium consistence. He had during the last five months repeated the whole of his experiments with increased care and precaution against error. The tables showed, first, that some of the amalgams took several days before they settled down into a state of rest, and that during this period the gradual contraction, which took place in almost every instance, proceeded very irregularly, being occasionally interrupted by a slight expansion. Secondly, some amalgams should be mixed wet, some medium, and some as dry as possible, these results being in some cases quite opposed to the directions sent out by the makers. For instance, "Sullivan's" was found to give the best results when mixed of medium consistence, and better moist than dry; whilst "Ash's" was best used soft. Then with regard to the so-called "expanding amalgams," his experiments showed that this expansion was only obtained under certain conditions, and not under all, as had generally been supposed. Thus, Fletcher's expanding amalgam was found only to expand when used dry. Lastly, he had found that price of an amalgam was no criterion whatever as to its practical value, some of the most expensive not showing as good results as others which were sold at a very moderate rate. His experiments were even now far from being completed, but he hoped to report more fully at a future time.

After some discussion, the PRESIDENT delivered his Inaugural Address, in the course of which he said: The Society has two well-defined aspects, scientific and social, and in those two conditions we find ample scope for usefulness, and, to his mind, irresistible claims on the support of the Profession at large. This Society is a scientific centre for Dentistry in our country. It is the spot where thought and enlightenment and progress are recorded and made permanent, and from which they are diffused abroad for the benefit of all who care to partake of them. It is the scientific home of our Profession, where the works of past ages are stored and arranged for the use of ages to come. Referring to the social aspect of the Society, among other influences against which we have to contend is the action of, happily, a limited number of members of the medical profession. They seem to think that anything is good enough, or that nothing is bad enough, for Dentistry, and although they would shrink with horror from one of their own branch of the healing art adopting certain methods of obtaining notoriety, they see nothing wrong in a Dentist doing so. They thus, by their countenance and support, do their best to encourage the advertising Dentist. Notwithstanding those influences which tend to make it hard for many of us to lead a professional life, the social influence of our Society is as a tower of strength amongst us.

Speaking of the government of the Society, Mr. TURNER observed, That an amount of discontent exists amongst a few members on certain points of administration. The officials of the Society, although elected by ballot, have been accused of cliqueism. I am not going to argue this matter in detail, but I would ask those gentlemen who have harboured such thoughts to analyse the Council list for the last few years, and see if the changes in the list of office-bearers have not been as frequent as is compatible with the safe government of an institution such as ours, the management of which involves, in many instances, the administration of phases of law which, though unwritten, are tacitly understood by those who have gone through all the stages of service on the Executive. Charges of nepotism have been whispered against the Council. I grant at once that there are two or three gentlemen on the Council whose fathers too have served in the capacity of Councillors, and who have also been Presidents of the Society. But it is now some considerable time since these latter acted in an official capacity, and I should be sorry to think that this Society should be deprived of the services of fit persons, because they happened to bear time-honoured and work-honoured names. I think that the last two Presidents of the Society point to another conclusion, for neither of these gentlemen had any forerunners to recommend them; and as for myself I can only say that "it is a far cry" from the work-bench to the Chair of the Odontological Society, and yet, gentlemen, that journey has been completed to-night; and in my opinion a Society which has a record such as this cannot fairly be taxed with either cliqueism or nepotism. Another murmur which has found expression in the pages of some of our journals is about the admission fee and the annual subscriptions of members. The Society, it is urged, is rich, and so the expense of membership should be reduced. I would suggest that if the Society be rich it has become so on the subscriptions of those who have been members from the first rather than on ours. But, gentlemen, is it rich? I much doubt it. The measure of an income is the charge upon it, rather than its actual amount. Time was when the Vicar of Wakefield was "passing rich on forty pounds a year." His present successor would be passing poor on four times that amount. And so it may be with our Society. Our funds have increased chiefly through the extra subscription charged to the London members. We hear it frequently said by provincial Dentists that, as they cannot attend the meetings, they don't think it worth their while to join, and lately we have had a resignation for this reason. I think that the remarks which have been made should dissipate such views, for if I am right in my interpretation of the functions of the Society, its advantages must accrue to the Profession generally. But I venture to think that the monetary objection is still more untenable than the inability to attend meetings. The monthly meetings are no doubt the most essential part of our business, but their attendant expenses are only a small part of our outlay, and beyond those expenses the benefits of the expenditure are shared equally by all. But what are the reputed riches of the Society? A vested sum of £2,000. Now, gentlemen, the time may not be far distant when the demands of the Dental Hospital and School may necessitate our removal from our present quarters, and but for the liberality of Sir Edwin Saunders it might have become the pressing question of the day with us. And although the pressure has passed away that is no reason for us to suppose that we are fixtures. On the contrary, the warnings which we have had should teach us to be, as far as possible, ready for such a contingency. I have alluded to the valuable Museum and Library we hold in trust for the Profession. Now, I would ask, are we to rely upon the chapter of accidents for its preservation in an emergency? Or are we, like prudent stewards, to prepare for what to me seems the inevitable, and be ready, so far as we may, to provide a worthy home for them and for our Society? Gentlemen, I need not seek to answer such a question, and I believe that, as your President, I will best meet your opinions and consult the interests of our Society, and of the Profession at large, by acting in accordance with these views, and, with your support, it shall be my endeavour so to do.

## PROSECUTION UNDER "THE DENTISTS ACT."

### THE BRITISH DENTAL ASSOCIATION *versus* HOLFORD.

THOMAS C. HOLFORD, of 342, High Street, Stratford, appeared before Mr. J. R. Phillips, Stipendiary Magistrate, at the West Ham Police Court, on the 30th of January, to answer a charge of having, on the 14th November, 1883, unlawfully taken and used the letters L.D.S., being the designation of a qualification or certificate in relation to Dentistry or Dental Surgery, which he did not then possess.

Mr. MELSHEIMER opened the case for the prosecution, and stated that the proceedings had been taken against the defendant under the last paragraph but one of section 4 of the Dentists Act of 1878. After citing certain decisions under the latter Act, the learned counsel said, Mr. Holford had used the designation of the qualification of Licentiate of Dental Surgery, being only qualified by a foreign body in Ontario under a diploma which he obtained there, and which the General Medical Council of the United Kingdom had, upon his application, and after due consideration, refused to recognise.

Mr. W. C. J. MILLER, Registrar of the General Council of Medical Education and Registration of the United Kingdom, produced the Resolution of the Council passed on the 29th November, 1883, and confirmed on the 17th January, 1884, sanctioning the prosecution of the defendant. He produced the original claim to registration signed by the defendant "L.D.S. Ontario," and stated that the same was considered by the General Medical Council and refused. The witness also produced the Dentists' Register for 1883 and 1884, in which the defendant was registered as having been in practice before 1878, and not as holding any other qualification.

Mr. FREDERICK CANTON, M.R.C.S., L.D.S.Eng., &c., Hon. Sec. to the British Dental Association, was then called and stated that the only meaning to the Profession of the designation "L.D.S.," when used in connection with Dentistry, was that the person using it is a Licentiate in Dental Surgery of one of the Royal Colleges of the United Kingdom.

Cross-examined by Mr. WILLIS: Mr. Canton stated that he was not aware that the defendant was a Licentiate in Dental Surgery, and that he had not seen the certificate granted to the defendant by the Royal College of Ontario. He further stated that the proceedings had been taken against the defendant, who was an entire stranger to him, under instructions received from the Representative Board of the British Dental Association.

Mr. JAMES SMITH TURNER, M.R.C.S., L.D.S.Eng., Vice-President of the British Dental Association, confirmed the evidence of Mr. Canton as to the meaning of the designation "L.D.S."

In cross-examination the witness stated that the Royal College of Surgeons of England, by Charter of 1858, acquired power to grant certificates in Dental Surgery after examination, and that there was then no other such title in the world; but on the passing of the Dentists Act, other bodies in England, Scotland, and Ireland were empowered to grant licenses in Dental Surgery, and it therefore became necessary to add other letters, so that it might be known in each case where the practitioner had received his diploma.

In re-examination the witness stated that the title "L.D.S.E." has no existence.

Mr. WILLIS then addressed the Court on behalf of the defendant, and contended that the certificate granted to the latter by the Royal College of Dental Surgeons of Ontario as a Licentiate in Dental Surgery, gave him a right to use the letters L.D.S. Further, that the defendant was registered as a Dentist, and had never denied or concealed the fact of his being a Licentiate in Dental Surgery of Ontario. That he had, on the contrary, shown his qualification to anyone who chose to ask him for it. That he had also sent it to the Medical Council, and that five years having been allowed to elapse without any steps being taken, the summons must fail.

After some discussion as to the Ontario Diploma, The MAGISTRATE reserved judgment until February 6th, on which date he delivered the following decision :—

This is a case of some importance to those practising Dentistry in this country. The defendant is a Dentist carrying on business at High Street, Stratford. Proceedings were taken against him under the 4th section of the 41st and 42nd Vic., chapter 53, under the authority of the General Council of Medical Education and Registration, which provides that if a person takes or uses the designation of any qualification or certificate in relation to Dentistry or Dental Surgery which he does not possess, he shall be liable on summary conviction to a fine not exceeding £20. The offence charged against the defendant in this case was that he assumed and used the letters L.D.S. after his name. This title, it is alleged, means a Licentiate in Dental Surgery, and a degree which can only be conferred by a diploma of the Medical Colleges in this country, and the evidence proved that the letters are so understood and recognised by the Profession in this country. The Act, however, does not limit the grant of title to bodies incorporated here. It does, in fact, recognise and provide for the recognition of Diplomas in Dental Surgery granted by foreign and colonial bodies, and it provides for the registration of Dentists holding such foreign and colonial qualifications.

The Defendant in this case is the holder of a Diploma as a Licentiate in Dental Surgery conferred upon him by a colonial body, admittedly capable of granting such a degree. This body is a Medical College of Ontario, Canada. The Dentists Act came into operation in 1878, and this is the first case under its provisions. This Act insists upon the registration in the Dental Register of all Dentists in the country under various qualifications there provided. The 6th section provides that any person shall be registered who (a) is a Licentiate in Dental Surgery, or Dentistry, or any of the Medical Authorities, or (b) is entitled as hereinafter mentioned to be registered as a foreign or Colonial Dentist, or (c) is at the passing of this Act *bonâ fide* engaged in the practice of Dentistry or Dental Surgery.

The Defendant applied for registration under the Act as being the holder of a Colonial Diploma under sub-clause B. The General Council refused registration on this qualification, refusing as they were entitled to do by section 10, the Diploma of the College of Ontario. The Defendant thereupon applied to be registered under sub-clause C, as having been in practice at the passing of the Act. He was so registered, and his name appears in the Dental Register with the qualification set forth in sub-clause C. Recently he was found to advertise himself with the title L.D.S. Having the provisions of the Act before me and upon the evidence given, I have arrived at the conclusion that the Defendant has committed an offence within the meaning of the Act in using the title L.D.S., those letters being the designation of a qualification which he does not possess. I think he would have been within his right if he had used the letters L.D.S. Ontario. He omitted the addition, and in so doing committed an offence. This is the first case under the Act. There is no desire so far as I understand that I should impose the full penalty or anything of that sort, and therefore having regard to the fact that he is an L.D.S. of a College, instead of fining him the full penalty, I shall fine him only £2 and costs.

## THE MANCHESTER DENTAL HOSPITAL.

A MEETING of subscribers to the Manchester Dental Hospital, Grosvenor-street, was held at that institution, on February the 18th, for the purpose of receiving a report as to the terms on which the proposed amalgamation of the Manchester and the Victoria Dental Hospitals is to be based.

The Rev. Dr. BURTON presided, and, after referring to the meeting held in the Town Hall on the 22nd of January, described the steps which have been taken since in order to bring about the amalgamation of the two hospitals. He stated that great credit was due to Mr. F. A. Huet for the important part which he had taken in the establishment of that institution. He had received a letter from Mr. Huet in which that gentleman said he approved of the arrangements that had been made by the two committees with one exception—namely, the alteration of the name of the Manchester Dental Hospital, which was already established, to that of an institution which was only in embryo. Mr. Huet also expressed the hope that the Dental Profession of Manchester would unite in an effort to make the institution a blessing to the poor, and an excellent clinical school for those who might wish to follow the Dental Profession.

The SECRETARY stated that since the 23rd of July last the number of patients treated in that institution had been 767, and the number of operations 1,001, of which 391 were on children under fourteen years of age; 114 cases had also been treated for irregularities of the teeth. He also submitted the balance-sheet, from which it appeared that £171 9*s*. 8*d*. had been received in subscriptions, of which amount there was now remaining in the bank, after allowing for the expenditure, £6 11*s*. 3*d*. The liabilities of the institution amounted to about £19, while the assets were worth £700. The report and balance-sheet were adopted.

THE CHAIRMAN stated that the terms on which the proposed amalgamation was to take place constituted the next matter for consideration. Although the promoters of the Victoria Dental Hospital had not even a building of their own, he had been induced to agree to the terms which would be submitted to that meeting, because he clearly saw that they had superior professional strength at their back.

Mr. NORTH then read the agreement entered into by the committees appointed to act on behalf of the two hospitals. It provided that the Victoria Dental Hospital shall take over the tenancy of the premises in Grosvenor-street, now known as the Manchester Dental Hospital, and that the building is to be henceforth known as the Victoria Dental Hospital. Subscribers of five guineas to the existing institution are to be life governors of the Victoria Dental Hospital, and the present annual subscribers are to have all the rights and privileges in the new institution to which their subscriptions entitle them in the Manchester Dental Hospital.

The Rev. J. B. M'GOVERN stated that he approved of amalgamation, but he considered that the Manchester Dental Hospital was practically being swamped and not amalgamated.

After a few observations from the CHAIRMAN, who admitted the truth of Mr. M'Govern's remarks, the resolution was carried. The thanks of the meeting were given to Mr. Huet for the exertions he had made in the establishment of that institution.

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## JOURNALISTIC SUMMARY.

### DENTAL COSMOS *(February, PHILADELPHIA)*.

"EMBRYOLOGY, with Special Reference to the Development of the Teeth and Contiguous Parts," by J. L. Williams. In this Paper, which was read before the New England Dental Society in October last. The writer gives a brief summary of the early stages of the development of the embryo.

"ALVEOLAR ABSCESS Opening into the Antrum and Nasal Cavity, Simulating Chronic Nasal Catarrh," by Dr. John S. Marshall. Having alluded to chronic inflammation of the lining membrane, the writer proceeds to consider abscess in connection with the teeth communicating with and affecting the antrum. Two cases are mentioned which had occurred in practice.

"RADICAL and Heroic Treatment of Alveolar Abscess by Amputation of Roots of Teeth," by Dr. J. N. Farrar. The writer believes that the time will come when this operation will not only be considered as highly scientific, but will be endorsed by all progressive operators. The description of the operation is to be diagramatically illustrated in another number.

"SYPHILITIC TEETH" is a translation from the French of Alfred Fournier, and continued from the previous number. The author considers that dental erosion cannot be considered as an affection of one or several teeth; it represents the affection of the organic system. It would be inexplicable by the action of an entirely local cause, and is of necessity the product of an influence of a general kind, the character of which we have especial interest in knowing and which it remains for us to seek out. He then mentions three principal opinions as to the Etiology of Dental Erosion; first, that it has no relation with syphilis, but is connected with a special affection of infancy; secondly, it is always and exclusively the result of hereditary syphilitic influence; thirdly, it is simply an ordinary lesion, but originating from syphilis, with a marked frequency and even appearing to originate from it alone in one of its forms—the Hutchinson tooth. He then proceeds to say we frequently discover in patients affected with dental erosions either syphilitic antecedents or actual symptoms of syphilis. Examine a certain number of persons affected with dental erosion, and you will recognise, not upon all, but upon the majority, evidence of syphilitic heredity. You will be duly informed as to some of them by an exact clinical history, among others you will find the manifest remains of specific symptoms — cutaneous cicatrices, corneal opacities, etc.

The Editorial article is upon "TEMPERAMENT IN RELATION TO THE TEETH," and tables are given setting forth the several temperaments and their indications.

### THE DENTAL REGISTER *(February, CINCINNATI)*.

"PYORRHŒA ALVEOLARIS," by G. A. Mills. This Paper was read at a meeting of the New England Dental Association in October last. The writer emphasises as an established truth that the character of this disorder is the same as in alveolar abscess, and the same procedure and methods of treatment that prove most efficient in the case of abscess will also prove efficacious and bring about the desired result when applied to the disease under consideration. The reproduction of tissues about the apex of a root that has been destroyed by an abscess is not different from the process of reproduction of the same tissues by the side of a root or about it when they have been removed, as in the case of pericementitis. He does not consider Pyorrhœa Alveolaris a disease, but the effects of one, and he holds that the general expression is the result of perverted functional action or neurosis of that branch of nerves that preside over the process of assimilation; and yet he sees no other conclusion to arrive at, as a general or final cause, but depleted nerve force.

"REPORT ON THE TEETH OF A MOUND-BUILDER," by Dr. E. G. Betty. The jaws are both massive and somewhat larger than the average jaws of the present day; the full number of teeth were present with the exception of the third molar on the left side of the lower jaw and on the right side of the upper jaw, there being no evidence of the presence or eruption of either of those teeth. The teeth are massive, solid, square, and well developed in every particular, the enamel being very thick. They are very much worn down, and in several instances the pulp cavities are exposed, and abscesses have existed in connection with them. The curves of the arch are perfectly even and symmetrical.

"ON THE TREATMENT OF PULPLESS TEETH," by F. H. Balkwill, L.D.S.Eng. This is a Paper read by that gentleman at the Plymouth meeting of the British Dental Association.

**THE INDEPENDENT PRACTITIONER** *(February, NEW YORK).*

"FERMENTATION in the Human Mouth; its Relation to Caries of the Teeth," by Dr. W. D. Miller. This article is reproduced on page 117 of the DENTAL RECORD.

"SYSTEM as applied to Instruments and Books," by Dr. W. St. George Elliott. A man who takes pride in his operations should take some pride in his instruments, seeing that they are in perfect working order, and that they are clean. All instruments should be handsome as well as good, attractive to the professional eye as well as efficient. All Dr. Elliott's ordinary instruments are made with socket handles, of which he has nearly a hundred. These have celluloid centres in different colours, and are made as follows:—A piece of celluloid the necessary size—say 2 inches long by ½ an inch thick—is drilled through lengthwise; together with the steel handle, it is heated over a Bunsen Burner, and, when the celluloid is soft, the steel is driven through as far as may be required. Brass ends are added, and soft soldered on; it is then put on the lathe and the celluloid and end pieces turned down to suit, and nickel-plated. This forms a permanent handle which, for beauty and efficiency, leaves nothing to be desired. The points are changeable in the sense that they are replaced with new ones when worn out. Excavators of a certain form have different coloured celluloid attachments, and by their definite arrangement the hand can be instantly placed upon the instrument needed. Dr. Elliott then gives a description of keeping his appointment-book, day-book, and ledger; and though he does not pretend that so elaborate a system is always necessary, for a small practice can be kept in a small book, but to properly manage a large practice a thorough system is called for.

"DENTAL NOTES in Different Parts of the World," by Dr. G. H. Perine. This article is a *résumé* of the works of the most notable Dentists on the Continent of Europe, mention being made of Louwenhock, of Holland, who discovered the tubuli of Dentine in 1678; of Ryff, a German, who in 1560 invented the Pelican, an instrument for extracting teeth; and Purrmann of Breslau, who took an impression of the mouth in wax as early as 1690; of Pfaff, Dentist to Frederick the Great, who took a plaster model of the mouth in 1756.

"The Case of FRACTURE of the INFERIOR JAW," by Dr. J. B. Gunning. The writer describes the treatment of a compound comminuted fracture; by means of a hard rubber inter-Dental splint, some pieces of necrosed bone were removed during the period of treatment, and now the back teeth meet prematurely with the upper ones, owing, it is said, to injury to the capsular ligaments. The chief importance of this case lies in the fact that it is a complete demonstration that an inter-Dental splint, which covers all the teeth of the lower jaw, will hold the fragments in place when the fracture is between the canine teeth, without external appliances. In fact, it will do this in nearly all cases, even when the fracture is as far back as the first permanent molar.

"REMARKS UPON DISEASES OF THE ANTRUM," by Dr. Frank Abbott. This is the subject of a Paper which was read before the Dental Society of the State of New York.

## NEW ENGLAND JOURNAL OF DENTISTRY

*(February, SPRINGFIELD).*

"EARLY TREATMENT OF THE TEETH," by Dr. G. F. Eames. In this Paper, which was read before the Massachusetts Dental Society, the writer urges more attention being given to this subject as one of the indispensables in the salvation of teeth in the adult. He thinks instruction must be conveyed to the people, and it should not be considered unprofessional to give lectures designed to instruct the public in these matters, and in this way much could be said which we could not say privately in the office, for fear of giving offence. He suggests that the lecturer should not speak to the people among whom he is practising, but that exchanges be made between different cities and towns. The effects of pregnancy upon the teeth, the question of lancing the gums and hygienic treatment, are some of the points considered by the writer.

"A HISTORY OF DENTISTRY," by Dr. G. H. Perine. This portion of the article treats upon the advances of the Specialty in England and its present status, referring to the work of Hunter, Blake, Fox, and many others.

"A REVIEW," by Dr. D. N. Claff, is the title of a Paper read at the 19th Annual Meeting of the Massachusetts Dental Society in December last, and deals with the question of the progress made in gold filling during the past twenty years.

"A RARE CASE IN DENTAL PRACTICE," by Dr. W. F. Johnson. A notice of this Paper is given in the epitome of *Items of Interest*, page 142, as "Mercurial Poisoning."

### ITEMS OF INTEREST *(February, PHILADELPHIA).*

"Thoroughness in Dental Operations," by Dr. W. S. Elliott. Where a spongy or fungus gum approximates a cavity of decay to the extent that it is necessary to wedge it back in order to gain access, and, though the operation is skilfully performed, a degree of failure may be anticipated, by allowing the gum to return over a portion of the filling, thereby forming a receptacle for the retention of depraved mucus and other foreign matter. The proper treatment of the gum is necessary to complete success. To fill, upon the first presentation, pulp cavities, etc., is almost sure to excite the periosteum to congestion or inflammation ; and too great haste in the treatment will also tend to similar results. In most cases of failure it will be proven either that sufficient time or care was not taken in the preparation of the cavity. Having treated the root daily until all fœtor has passed away, he then fills with phosphate of zinc. In one week—if all has gone right—a permanent crown filling may be inserted over the zinc. A want of thoroughness in excavating that portion of the dentine nearest the neck of the tooth in approximal cavities and imperfect condensation of the first portions of gold introduced are also items of consideration.

"Reflex Action of the Nerves." This is a small portion of the discussion upon the subject at the American Convention. Dr. Lovejoy mentioned a case in which there was pain in a toe, due to an impacted wisdom tooth. Dr. Reed instanced a case of deafness due to the same cause, which was entirely relieved by extracting the wisdom tooth. Dr. Allen and Dr. White each mentioned a case where an eye was considerably affected from similar causes. In the latter instance the patient thought he was losing the sight of one eye, for which he had been under treatment for a long time. On the removal of some of the teeth the affected eye was very much better, and in two weeks afterwards he could use one eye as well as the other.

"Diagnosis," by Dr. L. C. Ingersoll. This is a Paper read before the Iowa State Dental Society. Having stated that diagnosis is the art of detecting disease through the interpretation of symptoms, and that diagnosis is the most comprehensive science relating to the practice of Dentistry, the author thinks there are no greater failures in diagnosis than are made with regard to the pathological conditions of the Dental pulp. This delicate organ is so concealed from view, and its manifestations of disease so peculiar and obscure, that a correct observation of symptoms is extremely difficult. Great allowance must be made for errors of judgment concerning its pathological state ; experience is a large factor in correcting such errors.

"The Teeth in Sickness."—This is a reproduction of an Editorial article in the *British Journal of Dental Science.*

"CIVILIZATION AND THE TEETH," by R. Finlay Hunt. The author regards it as a fact that, as the onward progress or conquest of the civilized races breaks into and changes the habits of the uncivilized, the physical state of health of the latter is impaired. Even though the habits of living enjoined by the hygienic rules, which the writer mentions should be universal in this country (America), it would require several generations of recuperation and heredity to bring our people to the state of health enjoyed by the esquimaux, Indians, and Sandwich Islanders in the days of their purely primitive habits of life.

"REMARKS on the Nature of Changes which occur after the EXTRACTION of the Natural Teeth, and the propriety of the early Introduction of Artificial Substitutes," was the title of a Paper read before the Cincinnati Dental Association, by Prof. J. Richardson. The immediate issue or product of the inflammation which occurs after the extraction of a tooth is fibrinous exudation from the ruptured surface of the periosteum of the socket which, in its incipient stage of organization, takes the form of granules. In from ten days to two weeks the socket is partially or entirely capped with a fleshy substance. During this period the actions are directed almost wholly to reparation; absorption does not ordinarily occur until the inflammation has in a great measure subsided; and hence, at first, there is enlargement of the gums rather than waste by absorption. After the inflammation subsides these parts begin gradually to waste away under the action of the absorbents. Concurrently with the absorption there is deposition of osseous material within the socket through the same agency of the granules filling it; so that, in course of time, the cavity is partially filled in with bone, analagous in structure with the maxilla proper, while the more superficial portions of the granular formations are transformed into tissues identical with the soft structures immediately surrounding. It is in this manner, by the concurrent and co-operating actions of absorption and deposition, that the maxillary ridges attain ultimately a smooth regularity, a symmetrical form, noticeable when the changes are completed. His experience does not justify him in expressing a positive opinion as to the propriety or impropriety of inserting a plate at the earliest possible period after the removal of the natural organs, though he inclines to the belief that the best interests of the patient require the early introduction of artificial substitutes, in all cases demanding full dentures. But observation confirms the belief that active inflammation in the structures about the sockets retards absorption and delays the completion of those changes which it is important should occur at the earliest period consistent with the natural operations of the economy.

"PHYSICAL FORCE" is a short article by Dr. Levy C. Lane.

"Dental Specimens for the Microscope," by Dr. Henry S. Chase, is an article from the *Missouri Dental Journal*, and details the grinding and mounting of sections of a tooth.

"Mercurial Poisoning." A case of forty years' suffering but final cure is recorded by W. F. Johnson. At the age of thirteen, when sick with fever, the patient was treated with calomel; seventeen years afterwards the upper second bicuspid and first molar on the right side, together with the alveolar process attached, exfoliated and came away in a body. Other teeth and portions of the bone of the upper and the lower jaw also came away. The remaining teeth—seventeen in all—being in bad condition, were removed, and aromatic sulphuric acid, about one-half the officinal strength, was applied to the diseased bone three times a week for two weeks; chloride of zinc was then used twice a week for three weeks in a similar manner, the patient thoroughly cleansing the mouth with a wash of 15°/₀ of phenol sodique. Artificial teeth on rubber plates were made, and although nearly three years have passed, there has been no return of the discharge, and parts are to all appearances in a healthy condition.

"Answers to the Questions of the National Board of Dental Examiners for the Benefit of Students and Others," by Dr. W. S. Elliott. This article is an answer to the question, "What is an element?"

"Letters from a Mother to a Mother on the Formation, Growth, and Care of the Teeth," by Mrs. M. W. J. These letters, reprinted from the *Southern Dental Journal*, are upon—Letter 4, "Food Principles;" Letter 5, "Where the Elements of Tooth Substance are Found."

"Dentition as Indicative of the Age of the Animals of the Farm," is an abstract of the first portion of Prof. Brown's article, which appeared in the November number of the Dental Record.

"Wonderfully Made." This is a short dissertation by Dr. John W. Draper, upon certain structural and functional organic phenomena.

The Editorial Articles are upon "The Therapeutic Value of Rest and Sleep," and "Some Items of Interest in Physiology," this portion of the series—No. 5—dealing with the blood.

## CORRESPONDENZ-BLATT FÜR ZAHNÄRZTE

*(January, BERLIN).*

"Case of Hæmorrhage after Tooth Extraction," by Mr. Ulbrech, Ohlau. The hæmorrhage was from the socket of a right lower wisdom tooth. A plug saturated with a solution of perchloride of iron and salt, though renewed several times, did not suppress the flow of blood. The writer then took a piece of nickel-foil and pressed it over the socket and adjoining tooth, and, having got the approximate shape of the parts, he filled the nickel cup with plaster of Paris and inserted it in position, getting the patient to bite upon it. This controlled the bleeding, and was worn by the patient for three days.

The remaining articles are extracts from several journals.

## EXAMINATION QUESTIONS.

### ROYAL COLLEGE OF SURGEONS OF ENGLAND.

THE following questions were given at the written examination for the diploma in Dental Surgery on February 18th, 1884:—

#### ANATOMY AND PHYSIOLOGY.

1. Give the precise attachments of all the Muscles connected with the Lower Jaw, exclusive of those of expression.

2. Mention the Nerves distributed to the Mouth, and state what you know respecting the functions attributed to each.

#### SURGERY AND PATHOLOGY.

1. Enumerate the several causes which prevent or hinder Movement of the Lower Jaw, and indicate the treatment you consider appropriate to each case.

2. Describe the Pathological and Clinical differences between an Epithelioma and an Epulis.

#### DENTAL ANATOMY AND PHYSIOLOGY.

1. Give the general Dental Formula of Marsupialia. Point out the leading resemblances and differences between their teeth and those of Placental Mammals, illustrating your answer by reference to an animal belonging to each class.

2. Describe the structure and development of Cementum, comparing it with Bone. What is its general distribution upon the teeth of Mammalia?

3. Name the periods of (i.) commencement of Calcification of the several Permanent Teeth, (ii.) of Eruption of the same, (iii.) (approximately) of completion of their Roots.

#### DENTAL SURGERY AND PATHOLOGY.

1. If during extraction a Tooth slip into the Throat, what complications may arise? what symptoms will denote its position? and what will be the appropriate treatment?

2. Mention the symptoms on which you would rely, and the tests you would employ, in diagnosing Odontalgia from Neuralgia.

3. Describe the "transparent zone" of Dental Caries. What evidence exists as to its nature?

## PASS LIST.

THE following gentlemen were admitted Licentiates in Dental Surgery of the Royal College of Surgeons, England, on the 20th ult.:—

Apperly, H.
Ayers, A. W. P.
Baldwin, H.
Buckland, S. C.
Fox, A. M.
Mundell, S.
Pedley, R. D., M.R.C.S.

Two candidates were referred.

# Editorial.

## THE ODONTOLOGICAL SOCIETY.

In his inaugural address, on the 4th ult., the President of the Odontological Society alluded to the existing method of electing the Members of the Council of the Society. The question, thus made public, may be said to have two aspects: shall the Members have, independently of the Council, the opportunity of electing the whole or a part of the executive? or, shall the Council continue to be practically self-elective? If there be "an amount of discontent" regarding this part of the administration, any reform, if such be necessary, were more likely to be sought after by the Society than by the Council.

At the present time the Odontological Society is not the only body wherein "discontent exists;" but an important Institution of another profession is also the scene of dissatisfaction of a similar kind, which threatens apostacy.

The question, considered in its broadest sense, is, not the continuance of that which in the past has worked fairly well, but rather, What is best?

## GOSSIP.

Prof. Huxley states his belief (*Nineteeth Century*) that if the Medical Council, instead of insisting upon the Preliminary Examination in general education, which he believes to be entirely futile, were to insist upon a knowledge of elementary Physics, Chemistry, and Biology, they would be taking one of the greatest steps which at present can be made for the improvement of Medical education.

The Anniversary Dinner of the Licentiates in Dental Surgery, and the Odonto-Chirurgical Society, will this year take place on Thursday, the 13th day of March, in the Balmoral Hotel, Princes Street, Edinburgh. Wm. Herbert Williamson, M.D., L.D.S.Edin., D.D.S., will occupy the Chair, and John Moore Lipscombe, L.D.S.Eng., will act as Croupier. Dinner at 6.30 o'clock. Tickets, £1 1*s.*

Mr. Verrier has promised to give a Practical Demonstration in "Continuous Gum Facings," at the Offices of The Dental Manufacturing Company, 3, 4 & 5, Little Windmill Street, early in March. Gentlemen desiring to be present should communicate their intention without delay, that the necessary arrangements may be made.

Pressure of matter precludes the insertion of "Answers to Correspondents," and other items. Correspondents are requested to note the New Address of this Journal—3, 4 & 5, Little Windmill Street, Golden Square, W.

THE

DENTAL RECORD.

VOL. IV. APRIL 1, 1884. No. 4.

# OBSERVATIONS ON NEURALGIA OF DENTAL ORIGIN; ITS DISCRIMINATION AND OPERATIVE TREATMENT.

By J. MORLEY DENNIS,

*Dental Surgeon to the Grimsby and District Hospital.*

OF all the secondary affections connected with the teeth none is more troublesome than Neuralgia. It may be described as a disease of the nervous system manifesting itself by pains, which, in most cases, are unilateral, and which appear to follow accurately the course of particular nerves, and ramify, sometimes into a few, and sometimes into all of their terminal branches. It occurs in paroxysms, perhaps at nearly equidistant intervals, the pains being usually sudden in their onset, and of a stabbing, boring or burning character. The attack increases in severity on each successive occasion, while between the paroxysms the patient is usually free from pain, and the attack often ceases as suddenly as it comes on. It has been said* that from a pathological point of view the disease Neuralgia probably has no existence; it is but a symptom indicative of a lesion at some point, which may be discoverable, or may be hidden from our view; and it is not indicative of any one particular lesion, but of a great variety of morbid conditions. It often consists of pain, and of nothing else that we can perceive, and in many cases is attended by no inflammation, no detectable change of structure, and no fever. That pain is owing to some morbid condition, or to some irritation of a particular nerve, we may sometimes know by finding that it is felt exactly in the course, and following the distribution of that particular nerve; but in the absence of any such symptoms we have some difficulty in forming a correct diagnosis; and again the difficulty is increased when we consider that it may be produced by some source of irritation operating at a distance from the part in which the pain is felt. It may be in the brain itself, or in the spinal cord; in the trunk of the nerve that supplies the affected part, or in one of the remote branches of the same trunk, so that it is necessary when we can find no explanation of a pain in the place in which it is felt to look for some condition that may explain it in the trunk of the nerve supplying that part, or in the parts supplied by other branches of the same nerve. These remarks refer more particularly to Neuralgia of the trifacial nerve, which from the similarity of its symptoms to those of other diseases affecting the teeth—the dental pulp, and the alveolar periosteum—is liable to be mistaken for one or other of them, as also Neuralgia of dental origin is often mistaken for Neuralgia arising from other causes. It is, therefore, not only necessary that we should make ourselves acquainted with the symptoms of each, in order that in case it arises from irritation or any other morbid condition of the teeth or alveolus, we may, if possible, remove that irritation, and, on the other hand, if it arises from other causes, we may at once refer it to the general surgeon for treatment, but that we should also be able to define the locality of that irritation.

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* Tomes.

In making an examination of patients, with a view to the discovery of the origin of the pain from which they are suffering—and I cannot but consider this description of neuralgia rather as a symptom than as a disease *per se*, because, from whatever cause it arises, it is the effect of some condition existing sometimes at a considerable distance—we must not, however, place much reliance on the statements of patients, without at the same time giving due consideration to the possibility of the pain being reflected, and thus misleading us as to its origin. Many cases have been related in which the patient has ascribed pain to be due to some particular tooth, and which, on fuller investigation, proved to be caused by irritation from another tooth existing in a different part of the mouth, and in some cases the antagonistic tooth of the opposite jaw. Mr. Tomes relates a case in which this perverted sensation was so definite that it was with some difficulty he persuaded the patient that the source of his trouble was not where he felt the pain.

A gentleman requested him to extract a perfectly sound second *upper* molar, the tooth affected being the corresponding *lower* molar of which the pulp was exposed. The *lower* tooth was extracted under nitrous oxide, but so soon as he recovered he exclaimed, "You have taken out the *upper* tooth after all;" nor could he be persuaded, until he had felt the vacant space with his fingers, that such was not the case.

Mr. Stewart some time ago brought before the notice of the Profession another subject which it will repay us to consider at the present time; he points out very clearly the misleading effects of attention in cases of facial neuralgia from dental irritation, which, he says, "Must be continually kept in view in the practice of Dental Surgery, otherwise disappointment in the results of operations would be frequent. In a large proportion of cases of Neuralgia dependent on dental irritation the patient has a foregone conclusion that a tooth which he indicates is the source of the pain—a conclusion so firmly held that he has resolved on the extraction of the tooth, and is astonished and incredulous when told, after examination, that not it, but another, is really the seat of the pain. It is often difficult, and sometimes impossible, to compel belief that a tooth he had no reason to suspect, probably in the opposing jaw and several teeth distant, is the cause of all he has suffered, and should be extracted rather than the one he was prepared to lose. As cavities that produce acute dental irritation are generally recent, sometimes cause no pain in the tooth, and are often such as cannot possibly be seen or felt by the patient, he is obliged to search for the source of pain, and any tooth on the same side with the pain, that presents some altered appearance, is fixed on, and immediately, somehow or other, has pain transmitted to it. A dark stain merely, a chip—probably an old one—a root, however small, and especially a cavity plainly seen or felt, suffices to direct attention and pain to a particular tooth, although the stained part be sound, the chipped surface harmless, the root incapable of mischief, and the cavity dormant." It will be observed, therefore, how easily we may be mistaken in our diagnosis, unless we make a careful examination of the entire mouth with a determined intention to come at the true cause of the mischief, rather than lose the confidence of our patient by sacrificing a useful tooth without affording him any relief, for the sake of avoiding a little trouble. One difficulty we have to meet is that patients will not always act upon the advice given ; in this case, however, they must take the consequences.

Neuralgia may arise from chronic inflammation of the dental pulp, difficult eruption of wisdom teeth, secondary dentine in the pulp cavity ; decomposition of a dead pulp in a confined space ; exostosis ; alveolar periostitis, which may depend on the escape of decomposing matter through the pulp canal, or on roughening of the fang by absorption, exposure of sensitive dentine, etc., the most common cause being chronic inflammation of the pulp. Neuralgia may attack any of the three divisions of the fifth nerve, but rarely more than one at a time, and generally either the second or third. M. Trosseau attaches great importance to the diagnostic value of the tenderness sometimes felt over the first two cervical vertebræ ; in this, however, Dr. Anstie and Mr. Tomes do not entirely agree. The intermittent character of the pain is regarded by some as of great value in the recognition of the disease. If the pain is most acute about the temple, the irritating tooth is generally situated far back in the upper jaw ; when it is referred to the condyles the offending organ is generally in the back part of the lower jaw. These rules will aid us when it is caused by the difficult eruption of wisdom teeth, which should be cut down upon and removed, and if impaction is suspected the second molar may be extracted. When the pain is due to exostosis, absorption of the fang or secondary dentine extraction is necessary. In chronic inflammation of the pulp, if possible, treat the pulp antiseptically, cap and fill; if not, it must be destroyed and removed. In cases arising from decomposition of dead pulp, open out cavity, clear away decomposed matter, and disinfect. Where alveolar periostitis exists try leeches, iodine, aconite, etc.

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# ELECTRICITY: AND THE ELECTRIC LIGHT: IN REFERENCE TO DENTISTRY AND SURGERY.

By C. J. Boyd Wallis, L.D.S.Eng., &c.

## Part IX.—Batteries—*Continued.*

New Oxide of Copper Battery, by *MM. F. de Lalande and G. Chaperon.* This battery is formed with a single liquid and with a solid depolarising element by associating oxide of copper, caustic potash, and zinc. This battery possesses some remarkable properties. Depolarising electrodes are easily formed of oxide of copper by keeping it in contact with a plate or a cell of iron or copper which constitutes the positive pole of the element.

A simple form of this battery is represented in Fig. 22. It consists of a glass jar, V, at the bottom of which is placed a sheet-iron box, A, containing oxide of copper, B. An insulated copper wire is attached to this box. The zinc element consists of a thick wire of this metal coiled into a flat spiral, D, and suspended from a cover, E,

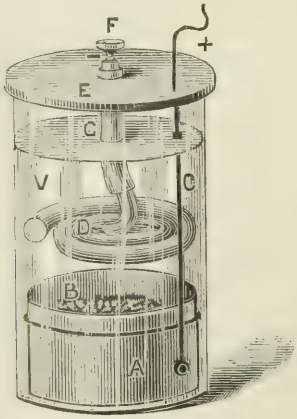

Fig. 22.

which carries a terminal, F, connected with the zinc; the zinc is protected by a covering of india rubber, G, where it dips into the liquid, to prevent it being eaten away at this level. The exciting fluid consists of a solution containing 30 or 40 per cent. of potash. The arrangement of this battery is similar to that of a Callaud element, with this difference, that the depolarising element is solid and insoluble.

In another form of this battery the oxide of copper is moulded into blocks. The oxide of copper is mixed with oxychloride of magnesium into a paste which sets in a short time, or very rapidly by the action of heat, and produces porous blocks of a solidity increasing with the quantity of cement employed (5 to 10 per cent.).

In this arrangement the glass cell is provided with a cover of copper screwing into the glass. This cover carries two vertical plates of sheet-iron, to which are fixed the oxide of copper blocks by means of india-rubber bands. The two iron plates are connected with a terminal, placed in the cover, which forms the positive pole. The zinc element is formed of a rod of this metal and passes through an india-rubber tube fixed in the centre of the cover. The cover also carries another tube which is covered by a split india-rubber tube to form a safety valve.

The cell is hermetically closed by means of an india-rubber tube encircling the cell and pressing against the glass and the cover. The potash is placed in the glass jar itself or in a separate box of sheet-iron.

Various other arrangements of this cell may be adopted, and will suggest themselves to the reader, therefore I will not stay to describe them, but pass on to notice some of the properties of the oxide of copper battery.

As a battery with a solid depolarising element, it has the advantage of only consuming its elements in proportion to its working; amalgamated zinc and copper are not attacked by the alkaline solution, it is, therefore, durable.

Its E.M.F. is very nearly one volt, and its internal resistance is very low, being $\frac{1}{3}$ or $\frac{1}{4}$ of an ohm for polar surfaces one decimetre square, separated by a distance of five centimetres.

The two small cells described each give about two ampères in short-circuit, and two elements can replace a large Bunsen cell. They are remarkably constant, and their great constancy is chiefly due to the progressive reduction of the depolarising electrode to the state of very conductive metal, which augments its conductivity and its depolarising power.

Peroxide of manganese possesses at first better conductivity than oxide of copper, but this property is lost by reduction and transformation into lower oxides. It follows that the copper battery will give a very large quantity of Electricity working through low resistances; whilst under these conditions manganese batteries are rapidly polarised.

The energy contained in an oxide of copper and potash battery is very great, and far superior to that stored by an accumulator of the same weight, but the rendering is much less rapid. These batteries are suitable for medical, microphonic, telephonic, telegraphic, and other purposes. For theatrical purposes the same battery will work through the whole performance, whereas with some other kinds relays of batteries are necessary. Their durability is very considerable; three cells will work continuously, night and day, Edison's microphones for more than four months without sensible loss of power. If the cell is well protected by a cover from the action of the carbonic acid of the atmosphere it will work for a hundred hours through low resistances, and can be worked at any moment for several months. In the solution potash is preferable to soda because it does not produce creeping salts like soda. Various modes of regeneration render this battery very economical. The deposited copper absorbs oxygen pretty readily by simple exposure to damp air, and can be used again. The same result may be produced very rapidly by an oxidising flame. Again, the battery may be treated as an accumulator, that is to say, by passing a current through it in the opposite direction, the various products are restored to their original condition; the copper absorbs oxygen, and the alkali is restored, whilst the zinc is deposited; but the spongy state of the deposited zinc necessitates its being submitted to a process, or to its being received upon a mercury support.

With a battery composed as follows:—

| | | Grammes. |
|---|---|---|
| Glass jar | weighing | 454 |
| Sheet-iron box and conductor | ,, | 41 |
| Zinc and slate lid | ,, | 419 |
| Oxide of copper | ,, | 200 |
| Commercial solution of potash, 40 per cent. | | 800 |
| Total | | 1914 |

M. Hospitalier, the Editor-in-Chief of *L'Electricien*, found the initial electro-motive force, one hour after being set up, to be 0·98 volts. The battery was put in circuit for six whole days through a resistance of German silver wire of 0·8 ohms; the current supplied was, on an average, half an ampère during the six days, or 518,400 seconds. The total quantity of Electricity supplied was 259,000 coulombs, the weight of zinc consumed 88 grammes, which corresponds to a theoretical production of 260,000 coulombs. This result s very favourable to Lalande and Chaperon's battery, for it shows that the local action is practically *nil.*

One of its advantages is that it is unnecessary, when the battery is not in use, to withdraw the elements from the solution as in the bichromate of potash batteries, therefore its energy is available at will. The useful available rendering is 0·02 kilogrammetres per second. In six days, therefore, the battery supplied 10,368 kilogrammetres of available electrical energy. This exceeds the results hitherto (1883) obtained with accumulators of the same weight, but the supply is much slower than with these latter. It is, however, easy to increase the rendering by increasing the surface of the elements and by diminishing the distance of the oxide from the zinc.

The reactions of this battery take up 1 equivalent of zinc, 1 of potash (or soda), 1 of binoxide of copper, and liberate 1 of powdered copper. The power and constancy of this battery, its great capacity for energy, and its absence of unpleasant smell, render it specially applicable for many purposes. The remarkable constancy of its current must be attributed chiefly to the fact that the product of the reduction is metallic copper, which is a good conductor, and that the solution of an alkaline salt of zinc which is formed presents a conductivity almost equal to that of the solution of potash. Professor Thomson, speaking of this battery in a letter to *The Electrician*, January, 1884, says, "That although it is inferior to the Bennett cell in electro-motive force, it is superior to it (and to every other kind of voltaic element hitherto known to me) in its very remarkable capacity for giving very strong and steady currents from plates of moderate area. The Bennett cell has a potential of from 1·2 to 1·3 volt when working through very great external resistances. The Lalande-Chaperon cell I have found, when first set up, to give very nearly one volt on very great (practical infinite) external resistances."

MAICHÉ'S BATTERY.—In this very original form of battery the inventor has endeavoured to fulfil all the conditions necessary to make his battery work for an indefinite time, and in this, owing to the method of depolarisation which he employs, he has in a great measure succeeded. In carrying out the ideas he had in view M. Maiché directed his study to the following objects:—1. To rigorously reduce the expenditure of zinc by using it completely immersed in water, lying on a bath of mercury; 2. To produce the most hydrogen, corresponding to the oxidation of zinc, with no cost for oxidation, by combining hydrogen with the air. Platinum, especially when in small particles, has catalytic properties, in virtue of which, by simple contact, it forms the chemical combinations which are only effected under the influence of other causes—for instance, of heat, yet itself does not undergo any change. This property of platinum is due to the faculty that it has of condensing gases on its surface. Thus a mixture of hydrogen and oxygen combines slowly, forming water by the simple contact of a plate of platinum, and the more finely platinum is divided, the more rapid are the combinations that it forms, especially when it is in the form of spongy or black platinum, it then attains its maximum energy.

Owing to the high price of platinum M. Maiché uses porous carbon, covered with a thick layer of black platinum, thus obtaining a great extent of surface at a small cost. This battery, Fig. 23, consists of a glass jar covered by an ebonite cover, to which is affixed a porous jar or chamber, pierced with large holes, filled with retort carbon, broken in pieces and platinized. The porous chamber is traversed by an ebonite tube supporting a small porcelain cup, in which is placed a small quantity of mercury and two small pieces of zinc, a platinum wire, connected to a terminal fixed on the cover, dips into the mercury, and establishes a good contact with the zinc. Another platinum wire connects a second terminal with the carbon fragments placed in the porous vase. The zinc is not attacked, except when the circuit of the battery is closed; it is plunged entirely in the liquid, consequently it is entirely used up without any loss.

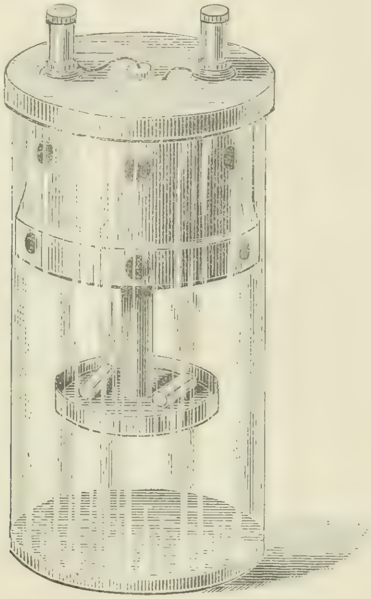

Fig. 23.

Under the influence of the platinized carbon the hydrogen of the water, which tends to polarise the carbon, combines with the oxygen of the air; the water that is produced by this combination contributes, to a certain degree, to replace that which is lost by evaporation. That this change may take place, the carbon should only be partially

($\frac{1}{3}$) immersed in the water; the rest becomes wetted by capillary action, whilst presenting a considerable surface to the air.

The exciting fluid may be water saturated with sea salt or sal-ammoniac, or acidulated by sulphuric acid, or the bisulphate of soda, in the proportion of 10 to 1.

It is stated that the force accumulated in the pile can sound a bell 100 times a day for more than half a century with an expense altogether of about 10 centimes. And during this time it would only be the zinc that would require renewing, as the platinized carbon preserves indefinitely its catalytic properties.

The electro-motive force of this battery is about 1·250 volt; but it is necessary to work it through an external resistance of about 3 kilometres of ordinary telegraph wire in order that it may work well. It requires 53 Daniell cells to replace (equal) 25 Maiché cells.

(*To be continued.*)

## BOOK REVIEW.

NOTES ON DENTAL PRACTICE. By HENRY C. QUINBY, L.D.S.I.
London: J. & A. Churchill. Liverpool: Gilbert G. Walmsley.

A WORK of some 200 pages bearing the above title has just been placed in our hands for review. It is a well got-up book, printed in clear type, upon good paper, and with 89 illustrations scattered through its pages, which, on the whole, are very good, and serve to illustrate the meaning of the text. In his Preface the author compares the not far distant past condition of Dentists, when their knowledge was held as a "jealously-guarded collection of trade secrets," with the present time, when the free interchange of thoughts and ideas is recognized as essential to the well-being of the Profession. It therefore behoves those who have had much experience to communicate the same to the fraternity at large, and this the author gives as his reason for publishing these "Notes." At the same time he desires it to be understood that he leaves the deeper physiological and pathological questions untouched, devoting his time to the more practical matters of the daily routine of the Dentist.

The book throughout is written in a very pleasant and readable style, and the author evidently has had a large experience as a practitioner; but we think, in the latter half especially, that he occasionally lays himself open to the charge of one-sidedness when propounding his views and methods, though evidently doing so from a sincere conviction of the truth of what he is saying; yet that conviction at times appears to be a somewhat warm one, if we may judge from many of the expressions used.

The first chapter opens with some capital remarks with regard to the general management of very young patients, impressing forcibly upon the student the necessity of winning the confidence of the children, and in no way subjecting them to such treatment as should lead to the name of the Dentist becoming a terror to them; but, rather, by patient and kindly treatment, seek to impress upon the child the necessity of having its teeth attended to till a habit is formed, to the child's lasting and permanent benefit.

Mr. Quinby seems to have been singularly fortunate in the treatment of children's temporary teeth, for he gives it as his experience that in the course of 25 years' extensive practice he has never met with a case of toothache in which he considered extraction necessary. In cases of exposed or nearly exposed pulps the author advocates the use of an arsenical dressing; after about a week this is removed and all the rough edges taken down, leaving the dead nerve untouched and the tooth unfilled, but so shaped that lodgments of food may be easily removed.

In cases of inflammation of the peridental membrane much the same treatment is indicated; the roots are cleaned, and the tooth so shaped as to prevent the accumulation of food in the cavity. The roots in any case are left undisturbed, as Mr. Quinby is of opinion that, although they will not now undergo the natural process of absorption, they will act as a guide to the *erupting permanent* tooth, and be gradually pushed aside as its successor advances, while, if the roots are extracted, there is the risk that the second tooth will either be much delayed or displaced.

Our experience in this matter is somewhat different, as we have more frequently seen cases of irregularity from the retention of these temporary roots, and we are scarcely of opinion that they serve as any guide, in any important sense of the word, to the permanent ones. Also, where a temporary molar has been removed on one side, the successor is often found in place long before the loss of the temporary on the opposite side.

The chapter upon the management of the mouth from the age of six up to the period of the eruption of the second molar is sound and practical, and we quite agree with the author in his desire, as a rule, to save the six-year-old molar until the second are fairly into place; and also in the treatment of the lower jaw to avoid all interference, as far as extracting goes, till the same period, and in no case to remove more than the corresponding temporary tooth to make room for its permanent successor. Mr. Quinby is very emphatic as to the most suitable stopping material in the mouths of children before puberty in all but dead teeth—recommending gutta-percha, and, upon masticating surfaces, protecting it from attrition by a gold cap. Without laying it down as a hard and fast rule, we think there is a great truth in what the author is here saying, though we cannot carry it, perhaps, to the same extent.

Very sound advice is given with regard to the treatment of the jaws at the period of eruption of the second molar. Should there be any crowding or marked indications of interstitial decay great beneficial results are undoubtedly obtained by the removal of two or more teeth, and necessary stress is here laid upon the caution that, unless the corresponding articulating tooth in opposite jaw is not removed at the same time, it will frequently elongate from want of an opponent, and thus prevent the closing up of the gap made by extraction; but the fact is not here taken into consideration that in a true articulation no tooth opposes another singly, and is, therefore, never left without an opponent by the extraction of one tooth only. Mr. Quinby does not mention the possibility that the wisdom tooth may never be erupted, in which case the loss of the six-year-old molar, if it be a sound tooth, is to be regretted unless the anterior teeth were very crowded. The author is most positive in his assertions that the bicuspids never fail to fall back after the removal of the molars; in most cases they undoubtedly will a little, but an interlocking bite will sometimes prevent it.

When treating the subject of Anæsthetics considerable prominence is given to chloroform, and the statement made that with children it may be used with "almost perfect safety" without questioning it, it is as certainly not absolutely safe, as a recent case under most able hands only too truly testifies.

Mr. Quinby recommends that it should be given early in the morning upon an entirely empty stomach, but this, we believe, is somewhat at variance with general experience, which is in favour of its administration some four hours after food, which seems to lessen the liability of vomiting. Nitrous oxide, he considers, can only be thoroughly satisfactory in the hands of those who make a specialty of tooth extraction, and that general practitioners are too much occupied in saving teeth to be able to give the necessary attention to its administration to obtain results which can be looked upon as completely successful. The advantages possessed by specialists are very evident, but we certainly think that highly satisfactory results are daily obtained by fully qualified Dentists.

The chapter on Irregularities is thoroughly practical throughout; and, without endeavouring to make a show of his individual skill in the treatment of difficult cases, the author has succeeded in bringing forward some good illustrations of the principal types of irregularity and his method of treating them, to which we cannot take exception, and we note that the time taken in the accomplishment of the various cases is usually given. The favourite methods he adopts are the nut-and-screw system, and the constant pressure of hardened gold bands bedded in the rubber frame and sprang upon the tooth which is to be operated on.

When speaking of the failure of metallic fillings in sensitive teeth, the author considers it in part due—as it undoubtedly is—to the inability of the operator under the circumstances to make a sound filling, but he also considers it due to "a degree of inflammation of the dental fibrils, which is a preliminary stage of decay, and which the quick conducting nature of the metal filling in absolute contact with them excites and maintains possibly until a vitiated exudation from them becomes a destructive agent, when the dentine breaks down and is destroyed under the filling, as we know that the alveolus and the cementum and the dentine itself are sometimes destroyed by the unhealthy exudation in alveolar abscess." Surely the author is somewhat drawing upon his imagination here, as inflammation cannot exist in the dentine in the absence of blood-vessels; and the possibility of a "vitiated exudation" proceeding from them, is quite contrary to our accepted ideas as to the nature of dentine, and will scarcely bear comparison with the known effects of alveolar abscess upon the surrounding tissue. But we of course thoroughly agree with the principle of inserting temporary non-conducting fillings in sensitive teeth.

The author is very emphatic, and justly so, in his desire to impress upon the student the necessity of filling interstitial cavities in the incisor teeth from the lingual surface, and enters a very warm protest against what he considers the "cruel" and "unprofessional" practice of wedging. Without entering into the question at length we think the assumed evil is very greatly exaggerated, and that in some instances a better filling can be done, and, if managed properly, with little inconvenience to the patient, by resorting to wedging. Mr. Quinby seems, however, to have been very successful in his cases, as he considers that, under favourable conditions, gold fillings can be made in the teeth of patients between the ages of 16 and 20, and the teeth left as though they had never decayed at all. If interstitial fillings are here indicated, we think this is saying a great deal, for, with few exceptions, a stopped tooth is always more or less a weak tooth.

We are rather surprised with the author's opinion of the rubber dam, which is to be considered as mainly useful as a convenience to the operator, "to enable him to leave the patient without danger to his work, or go to his lunch, or see another case for a moment," and he illustrates his opinion by referring to a case as detailed by a patient who, "gagged with the rubber dam," and with the "saliva ejector," a "sort of hydraulic pump" fixed to the mouth, and a "tongue depressor," to prevent any movement of that organ, was left in this decidedly unenviable condition during "the consultation hour, at the end of which period the Dentist came back refreshed and resumed his work." This, of course, was not professional conduct, but we do not think these most useful appliances are often abused in this way. The author also speaks of the mallet somewhat warmly, and considers that great harm is due to the teeth by its use, which should only be confined to the condensation of gold fillings in crown cavities, where strong thick walls are standing. Again in this matter, giving to Mr. Quinby as a Dentist of experience the credit of his opinion, we think that he is confounding use and abuse, and we imagine that most practitioners would agree with us in considering the mallet a most useful instrument in careful hands, and, as the author himself justly remarks, no one but a careful man with some amount of manipulative ability should ever pretend to be a Dentist. At the same time we do not wish to be understood to say that our general opinion disagrees with the tenor of this article, for many of his protests are not without great cause; the folly, for instance, that he points out, of subjecting a weak and nervous patient to a series of protracted gold fillings is very apparent and most justly condemned by him, as is also the all-gold theory. Mr. Quinby describes some very ready and rapid methods of building up teeth, such as, for instance, a bicuspid tooth with only either the lingual or labial wall standing, and lays considerable stress upon the value of gutta-percha, if, in this or any other cavities, decay has proceeded below the level of the gum, or wherever, indeed, it will not be subjected to attrition. In speaking of the formation of "pulp stones" in the pulp cavity, the author concludes that they are always probably connected with some of the dentinal tubes. In this we think differently, for our own investigations into the matter tend to show that they are isolated from them, and are formed from special cells, independently of the substance of the tooth.

Mr. Quinby employs gutta-percha for taking impressions of the mouth, and gives a detailed description of the most advantageous way of manipulating it, though personally we prefer plaster, which, by constant habit, may be used with considerable ease, yet we know that, when managed properly, most excellent results can be obtained with gutta-percha.

We have been much interested in reading this work, as the book is just what it professes to be, and is throughout the author's sincere and honest expression of his opinion, and such opinion, when it is the outcome of many years' conscientious hard work, is always most valuable. There are points to which we have taken exception, but we trust we have not given sufficient prominence to them to lead any one to imagine that we think slightingly of the work, for such is not our intention, and, in conclusion, we think Mr. Quinby should be congratulated as well as thanked for bringing his experiences before the Profession in so pleasant and readable a book.

J. S. A.

## FERMENTATION IN THE HUMAN MOUTH; ITS RELATION TO CARIES OF THE TEETH.

By Dr. W. D. Miller, Berlin.

(*Continued from page* 123.)

In addition to the experiments described in the preceding number of this journal (*Independent Practitioner*), I add the following:—A sound bicuspid tooth was sawed into sections, varying from one-third to one m. m. in thickness, and an equal number of these sections placed in each of two test-tubes. Into one of these test-tubes were then brought five c. c. of a perfectly neutralised two per cent. aqueous solution of beef extract; into the other the same solution, with the addition of 0·2 cane sugar. Both tubes with their contents were then sterilized, and, upon cooling, infected from a pure culture of the fungus under consideration.

The solution in the second tube became acid in a few hours; not so, however, with that in the first tube, it being non-fermentable. At the end of one week the thinner sections in the second tube were so far softened that one of them, removed for examination, could be easily bent between the fingers. At the end of the second week all but the thicker sections were completely decalcified. One of these sections was now placed upon the freezing microtome and made into cuts, which were stained in fuchsine and mounted in Canada balsam. A microscopic examination showed that the fungi had penetrated many of the tubules to a considerable depth, the invaded tubules being at the same time slightly extended. At the close of the third week the invasion was found to have become much more extensive, the tubules much dilated, and in some places the walls were broken through, leading to the formation of oval spaces or caverns in the dentine.

In short, we had a typical case of caries.

It is hardly necessary to state that the thinnest sections in the first tube, where the development of the fungus was not accompanied by an acid fermentation, did not show even the traces of softening, to say nothing of caries.

I had then produced caries by inoculating sound dentine from a pure culture of a fungus found in carious dentine, in the presence of the same fermentable substances that occur in the mouth. It seems that a clearer solution of the problem can at present scarcely be expected. Of course the thought at once suggests itself to every one that this decay is quite independent of putrefaction; all evidence points to the conclusion that putrefaction at most does nothing more than dispose of the already devitalised and much riddled remains of tissue, and we are in danger of over-rating its influence, even at this stage.

Pieces of dentine in a solution kept constantly pure and sour by fermentation, not only become softened and show the microscopic changes characteristic of carious dentine, but finally, after some months, disappear altogether, as has repeatedly been the case in my cultures. From this we must infer that the process commonly known as putrefaction is absolutely essential at no stage of caries; especially is this the case in caries of enamel.

It has been intimated that the active agent in this process is nearly related to, if not identical with, the fungus of sour milk: *Bacterium acidi lactici.* The analysis of the product of fermentation will show the truth or falsity of this supposition.

The method of carrying out such an analysis will now be given. Two hundred c. c. fresh saliva are mixed with 2·0 starch and allowed to stand forty-eight hours at blood temperature; the mixture is then filtered and heated to one hundred degrees Centigrade, to stop the fermentation. This process is repeated until about a litre of the solution has accumulated. It is then placed in a retort and reduced to a volume of about seventy-five c. c. It will be very strongly acid. A few drops of this liquid are added to a thin solution of methyl-violet, and leave it unchanged; from this we conclude that we have to deal with an organic acid, as an inorganic acid would turn it first blue, and then green. Since the acid did not distil during the prolonged boiling, we may set it down as non-volatile; hence a non-volatile, organic acid. The distillate was very slightly acid; we will call it distillate number one, as we wish to refer to it again.

The solution was further reduced in volume to about forty c. c. over the water-bath, and then transferred to a large glass vessel, briskly shaken with one and one-half to two litres of sulphuric ether, and allowed to stand until the ether became perfectly transparent. This was then filtered into a large retort and distilled, proper precautions being observed to prevent accidents. When the volume had been reduced to about fifty c. c. the solution was filtered into a porcelain vessel, and still further reduced over the water-bath. A portion of the solution tested in the short tube of a Mitscherlich double-shadow polaristrobometer gave, as a mean of nine readings, a rotation of the plane of polarisation equal to 0·015 degrees, or 0° 0'·9. In other words, the solution was optically inactive, the $0^\circ\ 0'{\cdot}9$ being far within the range of the error of experiment, especially as the solution was not absolutely transparent.

An excess of freshly prepared oxide of zinc was then added to the solution, and the whole slowly and carefully boiled, water being added as it was found necessary, till the reaction became neutral, or nearly so, filtered into a large glass evaporating dish, and put away at the temperature of the room for the salt to crystallise. A drop of this solution placed upon a glass slide gave, upon crystallisation, forms which were at once recognised as crystals of lactate of zinc. In a few days a quantity of a whitish crystalline powder had formed. This was placed upon a filter, the mother liquid squeezed out, washed in absolute alcohol, dissolved in hot water, re-crystallised and dried over sulphuric acid; it then weighed 0·343. After exposure to a temperature of one hundred degrees Centigrade, or a little more, till the weight became constant, it weighed 0·2816; it lost accordingly 17·9 per cent.* of water of crystallisation, corresponding to three molecules of water. The salt was then dissolved in water, the zinc precipitated as carbonate and burned. The burned mass (zinc oxide) weighed 0·0970. We have consequently:—Substance analysed (a zinc salt) = 0·343; oxide of zinc = 0·097. The zinc oxide is seen to be equivalent to 28·2 per cent. of the substance analysed.

The formula for the inactive ethylidene lactate of zinc is—

$$\left.\begin{matrix} C_3\,H_5\,O_3 \\ C_3\,H_5\,O_3 \end{matrix}\right\} Zn + 3\ H_2\,O, = 243 + 54.$$

Dried at ordinary temperature it contains 27·3 per cent. zinc oxide. The result obtained from the analysis differs, therefore, from that deduced from the formula by less than 1 per cent., and settles beyond doubt the fact that the substance analysed was the lactate of zinc, or that the acid generated by the fermentation is lactic acid, or, more exactly, inactive ethylidene lactic acid, since, as shown above, the acid solution was optically inactive, and the zinc salt contained three molecules of water of crystallisation. The salt was furthermore soluble in sixty-two parts water at fourteen degrees Centigrade. I repeated the analysis with the following solution:—Water, 1000 c. c.; saliva, 300 c. c.; bouillon, 200 c. c., made by boiling 125·0 beef ten minutes in 300 c. c. of water; sugar, 10·0.

This solution being slightly acid was neutralized with the carbonates of lime and sodium, sterilized, and infected from a pure culture of the fungus in question.

It was treated throughout exactly in the manner above described, except that the zinc salt was converted into the sulphide instead of the carbonate, and burned with powdered sulphur in a stream of hydrogen. The result was as follows:—Substance analysed, = 1·0540; zinc sulphide, = 0·415; zinc, = 26·38 per cent. instead of 26·74 as deduced from the formula, a difference of only one-third of one per cent.

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* Theoretically 18·2 or 0·3 per cent. more.

In this case the substance was dried at one hundred degrees Centigrade before weighing, and the formula becomes

$$\left.\begin{matrix} C_3\,H_5\,O_3 \\ C_3\,H_5\,O_3 \end{matrix}\right\} Zn = 243.$$

One more analysis was made, using:—Water, 1000 c. c.; liquid beef extract, 20 c. c.; sugar, 10·0.

The result was the same, and need not be given; the two analyses above described being abundantly sufficient to show that the acid generated by the fungus in question is the common ferment, lactic acid.

Distillate number one, referred to above, owed its slight acidity, we now know, in part at least to lactic acid, since, when an aqueous solution of lactic acid is boiled, a small fraction of the acid goes over with the water. To ascertain, however, whether any other acid, especially volatile, was present, the distillate was boiled with carbonate of lime, filtered, evaporated to dryness, a small amount of dilute sulphuric acid added, and heated in a retort over the water-bath; a few drops of an oily acid came over, which, when taken upon the fingers, smelled liked butyric acid; the amount, however, was so small, that no attempt could be made to analyse it.

I have been able with some degree of certainty to establish the presence of lactic acid in carious dentine, by a method theoretically so simple that it seems strange it has never been made use of before, but which, however, in practice is only carried out with great difficulty. My first and second attempts were only partially successful; the third succeeded sufficiently well to justify its description here.

In this experiment I made use of fifteen teeth, all containing considerable quantities of carious dentine, and all extracted on the day of use. The remains of food were first removed from the cavities, but none of the softened dentine; then all the softened dentine was taken out and placed in a porcelain vessel, cut or picked into fine pieces, placed in a test-tube with one c. c. of water, and two drops of a ten per cent. solution of hydrochloric acid added. Any free lactic acid in the carious dentine would remain free, and any existing in combination with lime would be set free by the hydrochloric acid. It was then gently shaken with about twenty-five c. c. sulphuric ether, and the latter, holding the lactic acid in solution was, after some minutes, poured off into a second test-tube; here it must be allowed to stand from twenty-four to forty-eight hours, till it becomes perfectly clear. It was then filtered into a porcelain dish, evaporated, a few drops of distilled water and a small quantity of *freshly prepared* zinc oxide added, gently boiled (water being added as necessary) for ten minutes, the three or four drops of liquid remaining filtered on to a glass slide, and allowed to crystallise. The close resemblance of the crystals to those of the lactate of zinc will be seen at once. There can, in fact, scarcely be a doubt that they are lactate of zinc crystals. The lactic acid concerned in their formation must of course have existed in the carious dentine.

I have noticed in the Dental journals a tendency on the part of some writers on this subject, to derive a large amount of satisfaction from the statement that, after all, what I have done to clear up the subject of Dental Caries was done and known long ago.

One writer even states that he might almost have said two years ago, something that I had said but a few months since. Let me say, once for all, that I have too little spare time to devote any of it to the discussion of the question who *said* this or that first, or even who *might almost* have *said* something two years ago. There is perhaps no human disease about which more has been *said* than about caries of the teeth, and when the subject shall have received its final settlement there will be hundreds who may say "I told you so." Malassez and Vignal very justly say of Baumgarten, who claims priority over Koch in the discovery of the tubercle bacillus: "*Il ne suffit pas de trouver, il faut prouver*"—and I do not hesitate to say with reference to some of the discussions which for years have been carried on concerning the cause of Dental Caries: *Il ne suffit pas de deviner, il faut trouver et prouver.*

It is not enough to guess the cause, or guess at it; we must *find* the cause, and, having found it, *prove* that it is the cause sought for.—*Independent Practitioner.*

## DENTITION AS INDICATIVE OF THE AGE OF THE ANIMALS OF THE FARM.

By Prof. G. T. Brown,

VETERINARY DEPARTMENT OF THE PRIVY COUNCIL.

*From the "Journal of the Royal Agricultural Society of England."*

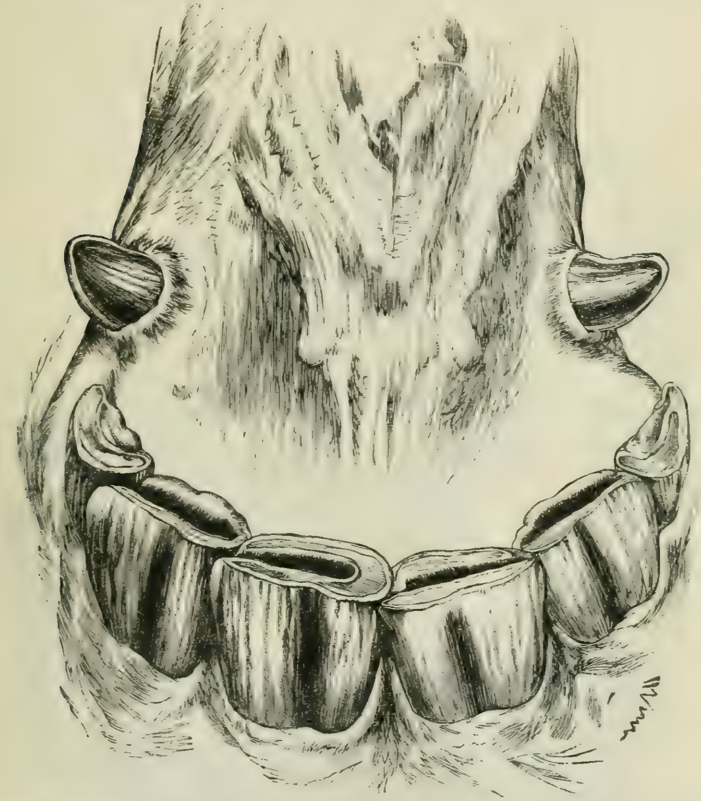
*(Continued from page 129.)*

At four years old the horse has the lateral permanent incisors in apposition, and the fourth and sixth molars are level, or nearly level, with the other teeth.

The tusks of the horse are often through the gums at four years of age, but they are not usually fully developed before five years, and occasionally they are not well up before five years and a half. As a means of judging the age these teeth are of little importance.

The following drawing (Fig. 13) represents the state of the incisor teeth on the completion of the fourth year.

Fig. 13.—*Incisors of Horse at four years.*

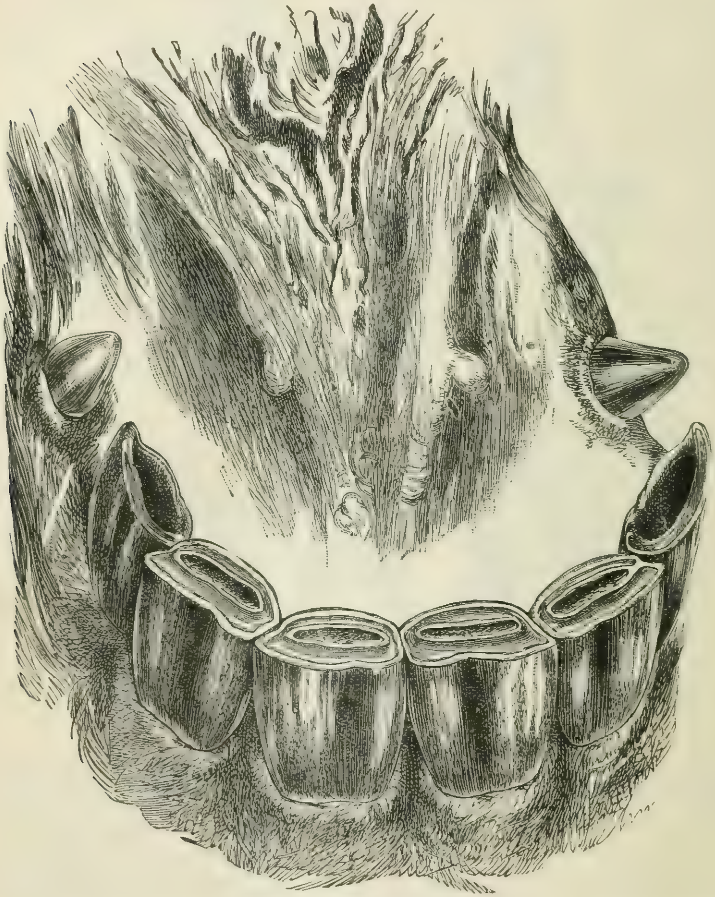


Remarkably well-developed tusks were an exceptional feature in the mouth of the animal from which the above illustration is taken; in other respects the teeth present the appearances which are ordinarily observed at the age of four years. The only milk-teeth now remaining are the four corner incisors, which are much worn and quite different from the broad permanent teeth, with which they are not likely to be confounded. In the lateral incisors the wear has affected the anterior edge of the tooth, and the cavity extends completely across the table, which is not, therefore, fully formed. In the central incisors there is a line of worn surface quite round the central cavity, and the table may be properly described as fully formed.

Incidentally it may be remarked that between the commencement and completion of the fourth year the dental changes include the cutting of four permanent incisors, two in each, four tusks, and eight molars—two on each side of both jaws, making sixteen teeth, which are all advancing at the same time.

Between four years and five the corner temporary incisors are removed, and the permanent teeth occupy their places. Indications of the change are seen at four years off in the upper corner incisors, and in a few months the temporary teeth are displaced and the permanent organs are in the mouth, but their edges do not meet until the fifth year is nearly completed, and even then the contact is limited to the anterior part, and a triangular space, similar to that which can be seen between the upper and lower corner teeth in the mouth of the yearling, may be recognised when the lips are separated at the

Fig. 14.—*Incisors of Horse at five years.*



side of the mouth. The shell-like character of the corner permanent teeth is the special indication of five years old.

In the next figure (Fig. 14) the condition of the incisors in the five-year-old mouth is shown.

In the illustration it is evident that the corner permanent incisors show but slight indications of wear on the completion of the fifth year, only the anterior edge exhibiting the effects of attrition. The tables of the lateral incisors are fully formed by the central cavity being surrounded by a line of worn surface. In the central incisors the cavity has become extremely shallow.

With the development of the permanent incisors the permanent dentition of the horse is completed.

*(To be continued.)*

## ODONTO-CHIRURGICAL SOCIETY.

### ANNUAL DINNER.

THE Annual Dinner of the Licentiates of Dental Surgery and Members of the Odonto-Chirurgical Society was held on the evening of March 13, in the Balmoral Hotel, Edinburgh. WILLIAM HERBERT WILLIAMSON, M.D., L.D.S.Edin., &c., Aberdeen, occupied the Chair, and the duties of Croupier were performed by Mr. John Moore Lipscomb, L.D.S.Eng. There was a good attendance. After an excellently-served dinner,

The CHAIRMAN proposed the usual loyal and patriotic toasts, which were duly honoured.

Dr. LITTLEJOHN, in giving "The Licentiates in Dental Surgery," said he took it as a great compliment to be called upon to propose the first toast after those which were generally called the statutory toasts of the evening. He recognised this toast as a most important one. Nothing had more interest to a sister profession like his own—that of Surgery—than to see gentlemen asserting their position, and, by submitting themselves to a proper examination, obtaining a proper diploma, and thereby soliciting an honourable position and securing the confidence of the public. (Applause.) He had great pleasure in proposing this toast. He had the honour of belonging to the Board of Examiners for Dental Licences, and he could truly say that the College which he had the honour to be connected with had most carefully and judiciously discharged its functions in the way of admitting gentlemen to the Profession of Dentistry. (Applause.) He was there to tell them that the gentlemen who came forward were submitted to a very careful and searching examination, and unless a man came up to the standard which the College had assumed to be the standard they at once gave them the go-bye. He was there also to state this gratifying fact that those who came up *sine curriculo* had again and again passed satisfactorily. They had managed to acquit themselves in such a manner as to obtain the applause of the Examiners. In the case of others who had gone through the curriculum he had frequently had occasion to mention that if such gentlemen had appeared to obtain the ordinary licence of the College—they were men who had so conscientiously studied anatomy, physiology, and chemistry—he was perfectly certain that they would have carried that licence with honours. There were gentlemen who apparently seized the opportunity of crossing the Channel and passing in Ireland in enormous numbers as compared with the number who came up at the rival Colleges of Edinburgh and London. It was not for him to give an explanation of that on the present occasion ; but the Royal College of Surgeons of Edinburgh, feeling the responsibility of its position, had risen to that position, and had instructed its Examiners on no occasion to pass any man to the register but those who were thoroughly capable not only of passing the examination, but of undertaking the practice of this honourable Profession, so that whatever other corporations might do the hands of the Edinburgh Corporation were clean. (Applause.) They could look every one in the face and say they submitted the candidates to a rigorous examination and admitted those who passed a satisfactory examination. He had great pleasure in proposing this toast and of associating it with the name of Mr. Stirling, Licentiate of Dental Surgery of the English College. (Applause.)

Mr. JOHN STIRLING, in acknowledging the toast, said it was to their interest to see as many licentiates on the register as possible, because, in raising the status of their Profession, they were raising themselves, and their responsibility became greater. It was all very well to say the next generation would reach the position they were striving to gain ; but surely something might be done in the present day in that direction. It was surprising to observe the apathy which existed among some regarding the degree of L.D.S., and to hear it said that it was too easily obtained in some places and too difficult to gain in others. He thought if a greater number tried to get the degree it would give them some excuse for what they said. The man who tried and failed was a better man than the man who never tried at all. (Applause.) The benefit he derived from the preparation and study he had gone through made him feel that he had at least gained something. Referring to the Medical Acts Amendment Bill, which had been introduced in the House of Lords, he said it would have no effect on the Dental Profession; he had hoped that it would have given more equality of examination, as it would have been desirable to have had one examination for the three countries. He was sure they were all thankful to the Medical Profession for having at all times shown so great an interest in their cause—(applause)—and such a desire to help it forward. (Applause.)

Dr. DAVID WILSON, in proposing "The Odonto-Chirurgical Society," said it did not require any eloquence on his part to recommend the toast to the company. He was very much struck, on looking over the many important subjects which had been brought under the consideration of the Society during the few years it had been in existence. It had now got into its "teens," and he hoped that when it attained its majority it would have a very good tale to tell of its achievements. He spoke of the prominence which had been given by the Society to the study of the use of anæsthetics and other important subjects, and said that the necessity for prosecuting these branches was a proof that the standard imposed on them was not too high. (Applause.) He had great pleasure in proposing "Prosperity to the Odonto-Chirurgical Society."

Mr. ANDREW WILSON, President of the Society, replied. He said that, having recently gone over the record of the Society, it was needless to recapitulate it further than to say that during the past session they had at least kept up the reputation it had gained as a scientific society. Frequent communication seemed to be absolutely essential if they wanted to keep up a healthy life in the members or in the body politic, and that was one of the main objects of the Odonto-Chirurgical Society. As regarded the advantages of scientific societies he would leave that to the gentleman who came after him, who represented the great Dental Scientific Society of this country. (Applause.)

Mr. J. S. AMOORE asked them to drink to the toast of "The Odontological and Sister Societies." The present conditions of these Societies must be highly satisfactory to their founders, and there could be no doubt that if the present system of Dental education advanced by the same rapid strides that it was now taking, that their value would be appreciated to a far higher degree by the great body of Dentists, and thus their prosperity would become still more prosperous. He coupled the toast with the name of a gentleman who had come from a great distance, and to whom it was both pleasure and profit to listen, and who had done much for his Profession in every way—Mr. James Smith Turner. (Applause.)

Mr. SMITH TURNER, President of the Odontological Society, in acknowledging the toast, expressed the pleasure he had in coming to his native city as the representative of the Odontological Society of Great Britain. That Society had been of great advantage and use to the Profession generally, and his own countrymen, with their usual shrewdness, had been able to appreciate its good work. Scotsmen were generally very ready to pick up anything very good and appropriate it. They had seen the necessity and virtue of general education, and they had appropriated the School Board. So it was with the Odonto-Chirurgical Society. It had been founded on principles similar to those of the Odontological, and they had established a Society which had been able to gather together the Dental Practitioners, and had obtained the support of the Medical Profession also. (Applause.) With regard to the Society he represented, it had recognized the necessity for education; but it had done more than that—it had recognized the necessity for special education—for an education such as Dentists required—an education which, if left out, would be fatal to the profession of a Dentist. He thought it was well they should always remember that the Licentiate of Dental Surgery was in every respect equal to the membership of any of their medical corporate bodies. They should remember that the time they took to go through their curriculum was the same—that the expense was the same, probably greater—and that the preliminary examination was the same; and he thought it was too true that, while the Dental Student gave up as much time, as much money, and perhaps more work to the study of his profession, and for the acquirement of a Dental qualification, he saw nothing in the future to come up to anything like the return which the Medical Student saw over his lifetime. The Dental Student deserved well of the Medical Profession and the public generally on this particular ground, that he studied entirely for the Dental Profession. The Medical Student saw before him a long vista—a number of vistas, he ought to say—in any of which he might achieve success. He saw before him the Army, the Navy, Sanitary, Poor Law, Lunacy and Parochial appointments. All these things were opened up to him as soon as he acquired his diploma. The Dentist had nothing of the kind. The Dental Diploma thus became an extremely dear and valuable one. The Odontological Society was the first to establish that curriculum. It had never been interfered with since it was put into the hands of the Medical Profession to be administered by it. They had recognized their Profession as a specialty, and, as a matter of course, they had recognized the necessity for a special education. There was no student who passed through the College of Surgeons of London or Edinburgh taking the Surgical Degree who had not a very fair general knowledge of the science of optics, or who did not know how to treat general cases of the eye, and who had not a very fair knowledge of the diseases of the ear and throat, and who had not also a very fair knowledge of skin diseases and midwifery. All these things had been made into special subjects by a certain number of men, and that with considerable advantage to the public and to the Profession too, because those men who practised the

Profession generally could not be so well up in any separate branch as one who gave his whole time to it. But in the ordinary curriculum they had a fair average knowledge of all these subjects. He spoke upon the book. But he never yet discovered anybody who knew anything of Dentistry. (Applause.) It was purely and entirely a specialist study, and they could go to no ordinary medical school in this country to be taught it. Very few Medical Students knew anything about it. Some of them might be able to extract teeth, but that was a very small part of Dentistry. They had to go to special hospitals for the study of Dentistry. That was the position they were placed in now—first by themselves and then by the Medical Profession. (Applause.)

He had wandered a long way from the Odontological Society, but that Society represents the scientific aspect of the Profession, and, seeing they had such a large number of educated men daily entering their ranks, he thought the importance of such a Society as this daily increased according to the education which they received. Not only did these societies keep them in countenance, but they helped them to appear without that awful stigma of meanness, and, he might say, blackguardism what attached itself to the lowest rank of their Profession. (Laughter.) They helped to keep them in favour and to maintain the individuality of their Profession before the professional world. They gave the public what they pretended to give them, and they spared no pains in acquiring that knowledge and ability. The Odontological Society was a flourishing Society, he was happy to say. Last year they had a very energetic president, and under his care they had a considerable addition to their members, although, also, they had taken steps to limit the number of constituents by making it necessary that every member must have a recognized Dental or Medical Diploma. (Applause.) As Dental Students took their L.D.S. they had helped to support such societies as this in order to get their Profession put before the eyes of the public. He did not think so much of that as of keeping it before the eyes of the professional world as a scientific Profession. (Applause.) He thanked them for the way the toast had been given and received.

The CHAIRMAN then proposed "The Licensing Bodies." The toast was a very important one, as it was from these bodies that they obtained their passes and parchments. It depended very much upon the way in which these parchments were obtained that they esteemed the body that gave them; and he need not travel very far in order to find a college that gave the diploma which was very highly esteemed. Dr. Littlejohn had somewhat forestalled his remarks by his statement as to the Edinburgh College, of which the gentleman whose name he was to couple with this toast held the honourable position of president. (Applause.) Dr. Smith had taken the initiative very much in the matter of Dental Reform and Dental Education. It was greatly owing to his exertions that the College of Surgeons was one of the first to come into the field and give a Dental Diploma to the Profession. (Applause.) They, in Scotland especially, owed very much to him for his exertions in the way of Dental Reform—(applause)—and that had been recognized by the British Dental Association, who had elected him president for the session. He asked them cordially to drink to "The Licensing Boards, and Dr. Smith."

The toast was enthusiastically honoured.

Dr. Smith, in acknowledging the toast, expressed the high sense of the honour he felt in having his name connected with it, more especially on behalf of those licensing bodies which conferred the diploma of L.D.S.—(applause)—and it was no self-gratulation in him to say that he felt, in responding to this toast, the honourable position in which he stood to one of these licensing bodies—namely, the Royal College of Surgeons of Edinburgh. (Applause.) He spoke of the one with which he was more immediately connected, but at the same time, in returning his acknowledgments for them, he would couple with it and include all the other licensing bodies which, as he had said, conferred the diploma of L.D.S. He thought it no affectation in him to say, when he spoke of the Royal College of Surgeons, that in its legislative and its representative capacity, as well as in its connection with the teaching and licensing of students, it had done, if not more, at least as much as any licensing body in the United Kingdom. (Applause.) In speaking thus he might refer to the abuse which the College had suffered at the hands of some of the inferior order of medical journals in London. That abuse was as unfounded and unfair as it possibly could be. It had been generally based upon the second-hand evidence of second-rate authorities, and, he could say, on his own observation, that that abuse had sunk to the very lees and dregs of factious opposition. He was glad to say that the Colleges here of Physicians and Surgeons and the Faculty of Glasgow were now likely to place themselves in a position where their vigour and strength would be more felt than ever it had been before. (Applause.) He did not deny that there might have been on the part of these and all licensing bodies room for improvement. He did not deny that legislation regarding examination in Medicine and Surgery might be improved. He did not say they were perfect. At the same time he did not think that it should be at the expense of the Scottish corporations, so that other medical bodies might occupy a position of isolated splendour and look down upon them. (Applause.) With regard to the Dental Diploma, all that fell from Mr. Turner was perfectly right, and he was sorry that Dental Students made such a sacrifice. They deserved every credit for what they did. He did not think they needed to make all that sacrifice, however, as a very few more classes would qualify them as full surgeons in case of need. He would only state that what had fallen from his friend in another respect—that medical men, and among them he supposed he was including Examiners for Dental Diplomas, knew nothing whatever of Dental Surgery or nothing about the teeth unless they studied Dental Surgery specially—was rather a sweeping assertion. The Medical Schools did teach Dental Surgery to a certain extent. He was sure that some of the books on Surgery in the hands of the students had a very large portion of them devoted to Dental Surgery. He did not say that the ordinary surgeon could stop teeth or construct artificial teeth. He thought if Mr. Turner only considered what was required in the way of extra study by those who were specialists in other branches of the Profession he was sure he would find very little difference between the amount of time required to make the one or the other proficient. At the same time he thought Dental Students deserved a great deal of credit. He often thought that the Dental Student spent so much time, money and trouble with the prospect, perhaps, as he had often said, of settling in Tongue, or Kildrummy, or some out-of-the-way district of Scotland, where there was no chance of remunerating himself for the immense expense he had incurred. He considered that Dentists required a great deal of praise for such self-sacrifice. (Applause.)

The CROUPIER proposed "The Edinburgh Dental Hospital and School." He said there was one thing he was sorry to see, and that was the small pecuniary interest which the general body of the Profession in Scotland took in this Institution. They were all anxious, or ought to be, that this branch of the Medical Profession should be an ornament to it, and that its members should be grounded in all the branches—not only that they should be good extractors of teeth, but thoroughly conversant with surgical operations and the treatment of diseases of the head and neck. He hoped the day was not far distant when the Dental Surgeon would be called into consultation more frequently than at present in reference to these diseases. (Applause.) He thought there was no doubt about it, as they had heard from other gentlemen, that the Medical Profession was taking a greater interest in their branch than hitherto. He was very pleased to hear that the Edinburgh Dental Hospital and School was sending out a good staff of Dental Surgeons. They had a Dean whom he was sure they in Scotland and in Great Britain ought to be proud of. He had done a great deal of hard work as Secretary and Dean of the Hospital. (Applause.) He was always willing to assist and encourage students in their work, and he was sure that so long as they had him as Dean he would still continue to encourage the students and get them thoroughly qualified for the position they were intended to hold. There was one thing he wanted, and that was willing hands to help him. Those who lived in the country were not able to do much, but they could give him their pecuniary and moral support. (Applause.)

Mr. W. B. Macleod, Dean of the Hospital, in acknowledging the toast, endorsed every word that Mr. Lipscomb had said in regard to the important nature of the Dental Hospital and School, and as to the status and ability of the Dental Staff. He was especially grateful to the worthy Croupier for the prominent position which he had given to the necessity of moral support that was to be derived from their provincial brethren. There was not the slightest doubt that since the institution of the Hospital they had received little pecuniary support. They had plenty of morality in Edinburgh—(laughter)—and if their provincial brethren insisted upon sending them their moral support, he hoped they would not send it plain, but gilt—it was pecuniary support they wanted most. The moral support could come after. (Laughter.) He had no doubt that the Institution would continue to flourish and prosper as a place where Dental instruction was to be obtained.

Mr. J. A. Biggs gave "Visitors from a Distance," which was acknowledged by Mr. Peter Crombie.

Mr. Finlayson asked a toast for "The American Schools of Dentistry," and referred to the indebtedness of Dentistry in this country to that of America. Many ideas they worked upon were American. He coupled the toast with the name of Mr. Squire Allen, who replied.

Mr. Walter Campbell proposed a toast to "Absent Friends," and, after Dr. Littlejohn had proposed "The Chairman," and Dr. Wilson "The Croupier," the proceedings terminated.

## SAUNDERS PRESENTATION.

The presentation of a portrait in oil of Sir Edwin Saunders to the Dental Hospital of London, Leicester Square, took place at that Institution on the 12th ult.

Prof. Erichsen, in making the presentation, said: Gentlemen, a most pleasing duty devolves upon me. I cannot but rejoice that the last act I shall have to perform in this chair is one in which I am the medium of doing honour to an old and most esteemed friend, and a most distinguished colleague of yours. The formal business of the annual meeting is now over, and we have reconstituted ourselves in order that we may present the portrait of Sir Edwin Saunders to this Institution. In doing so it is not my intention to dwell at any length upon the services that Sir Edwin Saunders has rendered to the Profession of which he is a member. Those services are probably better known to most of you than they can be to me. But there is one service that he has rendered to the Profession of which he is a member which I have had frequent opportunities of witnessing, and of which I may speak from my personal knowledge. Every profession, I need scarcely say, is judged of by the public from the manner in which the members of that profession conduct themselves towards the public, whether in private intercourse or on the occasion of public gatherings. I can most truly say that he does good and great service to his profession, whatever that profession may be, who invariably, in his intercourse with the public, adopts a high tone, shows himself the cultured gentleman, and is considerate and tender in his feelings and behaviour to those who come before him in the shape of patients, or those seeking his advice. All who know Sir Edwin Saunders know well that there is no man in any branch of the Profession who can exceed him in those qualities of the heart as well as of the mind, by which he has not only reflected honour upon himself, but credit upon his Profession, and the greatest possible boon upon those who have sought his professional advice. In that respect I think Sir Edwin Saunders has deserved most thoroughly well of his Profession as well as of the public. I say nothing of the way in which he has done his professional work—that, as I have already said, is probably better known to you than to me—; but the method of doing it, the manner of carrying it out, and his conduct in all relations of life, are such as not only have reflected credit upon him, but the highest credit and the highest honour upon his Profession, and more especially upon his branch of the Profession. If we go beyond this we shall find that Sir Edwin Saunders has truly well deserved the honour that he has gained, for he has not only secured, and was happy in securing at an early period of his life, the confidence of the most illustrious persons in this realm, but he secured it with an undivided affection, I may almost say, down to the very present time. (Applause.) That honour which it pleased Her Majesty to confer upon him might not only be considered a personal distinction conferred upon his branch of the Profession, but also a mark of personal favour shown by Her to a trusted servant, and to one from whom she had received the greatest possible comfort and solace. (Applause.) It has not been the lot of Sir Edwin Saunders to owe his position merely to the favour of princes. Of him it may truly be said that, *Principibus placuisse viris non ultima laus est.* He has done much to deserve public gratitude and public favour out of his Profession. To his liberality and to his enlightened beneficence we, to a very great extent, owe the fact that this Institution has attained the magnitude, the importance, and the dignity that now characterize it. (Applause.) Those services are truly very great to his Profession, so far as the educational department is concerned, for no great School of Dental Surgery can exist any more than a School of Medicine can exist, without the opportunity of obtaining practical and clinical instruction in a hospital connected with it; and by his beneficence and liberality he has, to a very great degree, increased the prosperity of the school indirectly by increasing the opportunities that that school can afford of giving practical instruction to its pupils. Then how much has he not done in the cause of public charity by assisting, as he has done so largely, in the founding of an Institution of this kind, where those who are the sufferers from one of the most terrible causes of suffering which can afflict the human race can always find ease, comfort, and solace? In whatever way we regard Sir Edwin Saunders—whether in his private capacity, in his public capacity as a professional man, or in his capacity as a benefactor of this great Institution, we must equally applaud his acts. We give him—or, rather, we give to this Institution—this portrait, which has been painted at the request of some of his friends and colleagues, to be presented to an Institution with which he has been so long connected in various capacities, and an Institution for which he has done so much, both in furthering its permanent establishment, and in increasing its utility to the public. [The portrait was then unveiled amid great applause.] Gentlemen, I have nothing more to say and nothing more to do than, in the name of the subscribers, to present to this Institution that portrait, which is a true and excellent similitude, apparently, of our most excellent and worthy friend and colleague.

Sir EDWIN SAUNDERS (who was received with great enthusiasm) said: Mr. Chairman and Gentlemen, were it not that I feel that I am surrounded by old and faithful friends, and that I may count upon their sympathy no less than upon their indulgence, I should find it difficult indeed to give any adequate or satisfactory expression to the feelings which have been called up in me by the gracious and eloquent words to which I have just listened. That at the close of a long professional career I should find I still possess the friendship and the good opinion of those with whom I have been intimately associated for many years, to whom I was drawn originally by similarity of interests and pursuits—by a certain community of spirit and feeling—still more, by earnest and self-denying co-operation, to advance our common Profession—that I should still possess their good opinion at the end of this career, is a subject of unalloyed gratification. That it should have issued in the arrangement by which my name is perpetuated in connection with this Hospital, which we have all laboured assiduously to create and to maintain, must satisfy the highest aspirations of the most ambitious. Gentlemen, in doing this, I feel you have done me a great honour and a great kindness, and you will not be surprised if I regard what you have done, rather in the latter than in the former aspect, for a man can live without honour, but he will be be poorly off without friendship. (Applause.) Your kindness, gentlemen, affects me deeply. It does happen that acts of generosity and kindness affect us as deeply, though in a different way, as do great calamities. I am reminded of a pathetic line in our great Peer Poet, Alfred, Lord Tennyson—peerless among living poets —in one of his earlier works, with which we are all familiar—the story of "Enoch Arden." When the wife of Enoch Arden despairs at length of ever again seeing her husband, when, in failing health and with dwindling resources, and having just buried her youngest child, she seems overwhelmed with her accumulated troubles, there comes her faithful friend, Philip Ray, to beg that he may be permitted to lift them out of their poverty and their misery, and to see to the education of her children, and she says—

"When you came in my sorrow broke me down;
And now I think your kindness breaks me down."

So, gentlemen, if I fail, as fail I shall, to express as I could wish what I feel on this occasion, I hope you will take the blame to yourselves, and I exclaim, with poor Annie Arden,

"Methinks your kindness breaks me down."

(Applause.) Gentlemen, this occasion is one of great gratification to me, but, like all human occasions, it is not without its shade of sadness. In life, as in art, there can be no true picture without shadow. But there are two shadows across the picture of to-day with which I could well dispense. One is that this is, as Mr. Rogers has already said, the last occasion on which we shall be privileged to address you, Sir, as Chairman. The last of anything affects one after a certain period of life. The last of anything seems to have a dismal and depressing ring with it, and I confess—and I think you will all feel with me—that we cannot, without a pang, listen for the last time to a voice to which our hearts have become attuned through years of harmonious intercourse, or gave for the last time in that position on a personality which we will not willingly let fade from our memories because it is engraven on our hearts. (Applause.) Gentlemen, the other shadow is so personal that I do not know that I ought to mention it. It is that I have arrived at that period which is the allotted span of man, and I feel the night shadows falling across my path. I am not one of those who ask, Is life worth living? and who hesitate for a moment. I say yes, a thousand times yes. (Applause.) Life, with all its failures, its imperfections, its unrealized aspirations, its physical pain, its mental anguish, with all its drawbacks, is very precious, and I would willingly put both those shadows away, if it could be so allowed. Well, gentlemen, I turn from these dismal contemplations, and I should like to say a few words as to my connection with this building. Exactly ten years ago this very 12th of March, a day memorable as having been a high festival in London, the Queen brought the Grand Duchess Marie of Russia to present her to the English people as the bride of her second son. We took advantage of that day to make the move from our former place in Soho Square into this building, and so I was enabled to fulfil a pledge I had given that in the event of this place in Leicester Square being accepted as our future home there should not be one day's hindrance in the working of the Hospital. That day enabled us to accomplish it without interrupting the work, for patients and professors alike were out of doors showing their loyalty to their Sovereign. I will not go further into that subject, but I must say one word about the latest addition to this building, an addition which, I think, really one may say does give a very great advantage. (Hear, hear.) Perhaps it may occur to some that it was a mistake not to have taken this place originally, but there were two great reasons for not doing so. In the first place, this portion of the building afforded us a very large increase of accommodation, and it also involved a largely increased annual expenditure, so that we should have been rash in undertaking anything beyond that. The small house at the corner was in a most ruinous state ; it was on a very much smaller scale ; it could not have been worked into the main building, and it was altogether dilapidated, and very costly—the cost of that small addition was out of all proportion to that of the main body of the building. There was another reason, and that was that there was a contemplated widening of the street, in which case it would have been bought up by the Board of Works, and then we should have stood at the corner of the new street. Those street improvements have been in abeyance ever since. I came the other day across a drawing of the place as it was originally, thanks to Mr. Ash, who was interested in the soup kitchen, which is the last use to which the building was put. It was open for a few weeks in the very depth of winter as a soup kitchen. In that drawing you see the original small house, and on the other part of the paper you will see that which it now is. We found that that would be too costly an addition, and that it would give too little for the money that it would have cost to make it worth while ; but when we found that the improvement was not to be made, and that the building still remained on hand, it seemed desirable that we should secure it. Finding there were no funds available for that purpose I put by my pocket money, I may say—(applause)—took down the ruinous old building, and built it up so as to augment the original structure. Well, gentlemen, I think I need not say more upon this. I am very glad, when the time came that it seemed most desirable that that addition should be thrown into it, it was in my power to give it. I thank you from my heart for the kind way in which you have received it. With respect to what you have been kind enough to do in placing my portrait in the Hospital I can only say that it was not what I expected—it was not what I desired—but I thank you because I believe it was done sincerely. Shakespeare—that great master of the human heart and of human emotion, who has given faultless expression to thoughts and sentiments suitable to every variety of character and temperament, and adapted to every condition and circumstances of human life, giving even to his humblest creations, clowns and serving maids, pearls of wisdom sparkling with diamonds of wit—has made Ophelia, in a few words of tender reproach, say to Hamlet, the faithless Hamlet, while returning his gifts, pledges of his now forgotten love—

> "Rich gifts wax poor when givers prove unkind."

So, gentlemen, I will say, if I may without sacrilege—

> "Rich gifts seem richer yet when givers are sincere."

(Applause.) Gentlemen, I believe the gift was sincere. (Applause.) I believe it was spontaneous. A great charm of it is that the amount was subscribed by a few personal friends. If there had been any canvassing or touting it would have taken from the charm, but I believe that it has been a spontaneous, kind, and generous gift on your part, and for that I feel extremely thankful. (Great applause.)

A vote of thanks to the Chairman was proposed by Mr. Cartwright, carried unanimously, and acknowledged by the Chairman, and the proceedings then terminated.

## DENTAL HOSPITAL OF LONDON.

The Annual General Meeting of Governors of the Dental Hospital of London was held at 40, Leicester Square, on March 12, John Eric Erichsen, Esq., F.R.S., in the Chair.

The Twenty-Sixth Annual Report of the Managing Committee was read. It stated that the total amount received during the year for the general account was £1,697 6*s*. 0*d*., as against £1,540 4*s*. 7*d*. in 1882. The donations of Life Governors amounted to £491 5*s*. 0*d*., as against £333 5*s*. 0*d*. in 1882.

The annual subscriptions amounted to £675 13*s*. 6*d*., as against £584 6*s*. 0*d*. in 1882; while the general donations amounted to £99 11*s*. 11*d*., as against £124 0*s*. 5*d*. in the previous year.

The amount received from the Metropolitan Hospital Sunday Fund was £61 17*s*. 6*d*., and from the Hospital Saturday Fund, £29 11*s*. 11*d*. The boxes at the Hospital yielded in 1883 the sum of £77 12*s*. 7*d*. being an increase of £25 14*s*. 6*d*. on the previous year.

The Special Donations received for the Extension Fund amounted to £1,132 4*s.* 0*d.*

Regarding the question of patients contributing in some form to the funds of the Institution, a Sub-Committee, consisting of five members of the Managing Committee and five members of the Medical Committee, was appointed to consider the feasibility of obtaining larger contributions from patients, with the result that they presented the following report to the Managing Committee, which was received and adopted :—

"After carefully considering the question respecting payment by patients, the Sub-Committee beg to report that they are of opinion that it is undesirable to demand payment from patients attending the Hospital, but that every effort should be made to induce them to contribute according to their means, and they recommend that the following leaflet be printed and distributed amongst the patients, and a box provided and placed in an accessible position to receive such voluntary contributions as the patients may desire to give."

"DENTAL HOSPITAL OF LONDON.

"This Hospital is dependent on Voluntary Contributions.

"There are few Patients who cannot give something, and assist the Hospital in extending its usefulness.

"If you have received any benefit, and would like to help, there is a Box in the Hall wherein you can put your contribution, and feel that it will help the Hospital to continue and increase its good work."

The Committee resolved that the freehold of the premises be purchased for the sum of £6,750, as recommended by the Extension Committee, and that the sum of £5,000 be raised on the property at 4 per cent. interest.

The additional accommodation given to the Odontological Society and to the British Dental Association, through the recent alterations, have enabled the Managing Committee to increase the rent of the former (to whom they have granted a lease of seven years), by £25 per annum, and of the latter by £15 per annum. The Odontological Society have spent upwards of £200 on furniture and for decorating the rooms occupied by them, and the thanks of the Managing Committee were accorded to the President, Treasurer, and Council of the Odontological Society for their liberality.

Sir Edwin Saunders had presented the Tower House as it stood for the enlargement and more perfect adaptation of the Hospital for the beneficent work for which it was established. Upon this the Committee expressed their high appreciation of this culminating act of Sir Edwin Saunders' continued generosity to the Hospital, and thanked him for his munificence. By this act of generosity the Hospital acquired possession of the lease, for over ninety years, of the wing on the east side free of cost. This gift made the amount of the contributions of Sir Edwin Saunders exceed £4,000 since the removal of the Hospital to Leicester Square. In response to a special appeal for funds to fit up and adapt the new wing, and to redeem the mortgage debt of £5,000 on the Hospital building, the Committee acknowledged contributions amounting to £1,132; and for the deficit the Committee specially appealed to pay off the debt, which pressed so heavily upon the Charity and materially curtailed the benefits it would otherwise be enabled to confer upon the suffering poor; and also to replace the funded property, amounting to £1,943 7*s*. 10*d*., they were compelled to sell for the part purchase of the freehold of the Hospital.

It having been suggested that a testimonial should be presented to Sir Edwin Saunders in recognition of his many generous gifts to this Hospital, by which he has so greatly increased the facilities for Dental Education, a Sub-Committee was appointed by the Managing Committee to carry out this object, which it was resolved should take the form of a portrait, to be placed in the Hospital. A few of Sir Edwin Saunders' more intimate friends speedily subscribed the required amount, and Mr. Carlile H. Macartney produced a portrait in oil which will be regarded with favour, not only as a likeness, but also as a very satisfactory work of art.

The Report of the Medical Committee contained the following statement of cases treated from January 1st to December 31st, 1883:—

| | | |
|---|---|---|
| Number of Patients attended | | 25,373 |
| Extractions | Children under 14 | 5,440 |
| | Adults | 10,356 |
| | Under Nitrous Oxide | 4,580 |
| Gold Stoppings | | 1,819 |
| White Foil ditto | | 102 |
| Plastic ditto | | 7,803 |
| Irregularities of the Teeth treated mechanically | | 1,456 |
| Miscellaneous Cases | | 2,484 |
| Advice Cases | | 1,582 |
| Total | | 35,622 |

In October the Committee received the resignation of Mr. Charles S. Tomes, who for the past ten years had occupied the Chair of Dental Anatomy and Physiology. Mr. Tomes' scientific attainments, original researches, peculiar aptitude for imparting knowledge, and unceasing earnestness in the discharge of his numerous duties, won for him the deep respect of his colleagues and of his students, and his resignation was received with unfeigned regret. Numerous candidates applied for the vacant post, both from the Dental and the scientific world at large, and, as the result of the election, the choice fell upon Mr. Arthur S. Underwood.

As a small mark of their appreciation of the valuable services of Mr. Francis K. Underwood, who for a period of nearly eight years had filled the office of Dean, the Managing Committee elected him an Honorary Life Governor of the Hospital.

Mr. Morton A. Smale, for some time Medical Tutor, was unanimously chosen to succeed Mr. Underwood as Dean.

In November Mr. Alfred Hill resigned his position on the Staff of the Hospital, he having been connected therewith for over a period of 25 years. It is needless to recall how earnestly Mr. Hill worked in the interests of the Hospital in its earlier years in various capacities, and how much the Institution is indebted to him for its present position. As Senior Surgeon, Mr. Hill has faithfully discharged his many and onerous duties, and as a sound practical teacher he will long be remembered by the students; and it was with sincere regret that his colleagues parted with their veteran officer. Mr. Hill has left behind him in the Hospital an honoured name, and a perfect example of self-sacrificing work in a good cause.

The number of students has considerably increased during the past year, and they have worked with much zeal and industry; and the extended accommodation effected in the Hospital by the Managing Committee, so largely through the munificence of Sir Edwin Saunders, has been a source of great satisfaction to the Staff and all concerned in the practical working of the Institution.

## NATIONAL DENTAL HOSPITAL.

THE Annual Meeting of the National Dental Hospital was held at the Hospital on Wednesday, 20th February, Dr. STRONG being in the Chair. The Twenty-Second Annual Report of the Committee of Management stated that a source of considerable satisfaction was the readiness liberal contributors have shown in meeting an offer to furnish two sums of £250 and £150, respectively, to meet equal sums provided by the Dowager Lady Howard de Walden, with the express object of discharging the existing debt.

In consequence of this the donations for the year amounted to £713 4*s.*, the annual subscriptions to £104 14*s.* 10*d.*, while the contributions from patients, which are a very good test of the appreciation of the Hospital by the poor, gave the large return of £200 17*s.* 7*d.*, or £70 10*s.* 2*d.* more than the total income of the Hospital ten years ago from all sources.

With the generous help thus afforded them, the Committee have been enabled to clear off all the Hospital's most heavy and pressing liabilities which had been accumulating for the previous two years, with the exception of the loan of £250 to their bankers, Messrs. Hoare; but this they hope to repay in 1884, as they have a balance of over £100 to begin the year with. The receipts for the year were £1,163 15*s.* 9*d.*, and the expenses £1,037 12*s.* 6*d.*, leaving a balance of £126 3*s.* 3*d.*

The Committee have received the promise of £200 from a very kind friend and old subscriber to the Hospital, Miss Smith, on the condition of nine similar sums being obtained, or £1,800 being raised in larger or smaller amounts, to form an Endowment Fund for the Hospital.

The Committee would therefore urge upon the subscribers and friends of the Hospital the importance of trying to secure the fulfilment of Miss Smith's generous promise, as it would be a great step towards rendering the Hospital self-supporting, and securing the permanence of the benefits conferred so largely on the poorer classes by the National Dental Hospital.

The Report of the Medical Committee showed an increase of 323 patients and of 5,409 cases treated, over those in 1882.

The following is the annual statement of operations performed from January 1st, 1883, to December 31st, 1883 :—

| | |
|---|---|
| Number of Patients attended | 17,843 |
| Extractions—Children under 14 | 4,873 |
| ,, Adults | 9,412 |
| ,, Under Nitrous Oxide | 2,546 |
| Gold Stoppings | 858 |
| Other Stoppings | 3,912 |
| Advice and Scaling | 2,188 |
| Irregularities of the Teeth | 1,132 |
| Miscellaneous | 2,326 |
| Total | 27,247 |

The Reports were adopted.

## EDINBURGH DENTAL HOSPITAL.

THE Annual Meeting of the Edinburgh Dental Hospital and School was held within the Hospital, No. 30, Chambers Street, Edinburgh, on 24th January, the Chair being occupied by the Right Honourable the LORD PROVOST.

The Report stated: The Dental Staff of the Hospital have much pleasure in drawing the attention of the directors and subscribers to the very great increase in the number of the patients during the past year, there having been 2,478 males, 3,120 females, making a total of 5,598. The conservative treatment of the teeth continues to receive the careful attention of the staff, and they have to report a steady increase in that department, the number of stoppings having been 561, as against 430 last year. Anæsthetics (chloroform and nitrous oxide) have also been more frequently exhibited; and several special cases, involving both surgical and mechanical treatment, have been undertaken with success, thus enabling the students to follow the details of a class of cases rarely met with in private practice.

The change in arrangements sanctioned by the directors at the half-yearly meeting, viz., the opening of the Operating Department in the evening, and the appointment of a Tutorial Dental Surgeon, who takes a continuous charge of the Stopping Department, was carried into effect at the beginning of the Winter Session, and, so far, has been attended with gratifying results.

Last year the sum subscribed by the patients amounted to £13; this year the sums donated amounted to £16 13*s.* 0½*d.*

The usefulness of the Hospital as means of educating the Dental Surgeon of the future is becoming more and more apparent. The number of Students attending is steadily on the increase, and their constant devotion to their work, their marked success in the various cases entrusted to them, their gentlemanly behaviour and sympathetic attention to the patients, have given the Dental Staff much satisfaction.

The facilities given to medical students to acquire a practical knowledge of the diseases of the teeth and their treatment, have been fully appreciated by such of them as may be looking to the Navy or Army as the future sphere of practice.

The Council of the Odonto-Chirurgical Society continue to place their valuable Museum and Library at the service of the students attending the Hospital

The receipts for the year amounted to £454 19*s.* 5*d.*, and the expenses to £449 9*s.* 3½*d.*, leaving a balance of £5 10*s.* 1½*d.* The credit at the bank at the end of the year was £219 13*s.* 10½*d.*

The CHAIRMAN moved the adoption of the report, which, he said, was a satisfactory one in every respect. He congratulated the directors and contributors on the financial feature which was noted, and trusted that the Institution would enjoy a career of even greater usefulness and prosperity than it had yet done. The community at large were under a debt of gratitude to the many professional gentlemen who took such a deep interest in the Institution. The Report was approved.

## THE ODONTOLOGICAL SOCIETY OF GREAT BRITAIN.

AT the Meeting of this Society, held on the 3rd ult., Mr. J. S. TURNER, M.R.C.S., President, in the Chair,

Mr. W. HERN read notes of three cases of defective development of the temporary teeth, and showed models of the cases. The first was that of a boy, aged seven, who had only four teeth in the lower jaw, viz., the second temporary and first permanent molar; in front of these the alveolar ridge was very narrow and gave no evidence of the presence of any tooth germs. The upper jaw contained six teeth, four of which corresponded to those in the lower jaw, the other two being pointed caniniform teeth situated in the incisor region. The boy's mother stated that he had never had any other teeth. Both the parents have their full complement of teeth, and so has a younger brother, aged four.

The second case was that of a boy aged six years. He had nine temporary teeth in the lower jaw, viz., the canines and molars, and three small conical teeth in the incisor region; the canines were well developed. In the upper jaw there were eight teeth, the lateral incisors being absent, whilst the central incisors were small and poorly developed. His brother, aged four, had only six teeth in the lower jaw, viz., the temporary canines and molars on each side, the canines being large and strong. In the upper jaw there were eight teeth, the lateral incisors being absent as in the case of his brother. The centrals were small, and stood a quarter of an inch apart. The mother stated that these children had never had any teeth extracted. Both she and the father had good teeth.

Mr. CUNNINGHAM read notes of a case of replantation, the tooth being a left upper central, which had been knocked out whilst playing football some four or five hours before. The tooth was carefully cleansed, pulp removed, and the canal filled, and replaced in its socket, where it was retained by silk ligatures, and protected by a mass of fossiline which was moulded round the four incisors on both the lingual and labial surfaces. At the end of ten days this broke away; the tooth was still loose, but appeared otherwise healthy. The fossiline was replaced, and lasted for a month, when it again broke away, but the tooth was now quite firm.

Mr. WEISS remarked that, in his opinion, a longer duration than six or seven years could not be expected in the majority of cases of replantation.

Mr. COLEMAN agreed with this, but thought that as the operation was not usually attended by much pain or inconvenience, the prospect of retaining a useful tooth for six years was quite sufficient to render the experiment worth trying.

Dr. FIELD also thought five or six years would be found to be about the average duration of apparently successful cases.

Mr. R. H. WOODHOUSE then read a communication from Mr. Dunn, of Florence, describing a method of filling and restoring the contour of broken or carious teeth, by inserting a piece of mineral tooth, or a piece of enamel cut from a natural tooth, accurately fitted, and fixed with white cement.

Mr. NEWLAND PEDLEY read notes of a case illustrating the application of Hammond's splint to the treatment of surgical division of the jaw.

Dr. FIELD exhibited, at the close of the meeting, an electric burring engine which he had been using for some time, and found to work very satisfactorily.

The PRESIDENT announced that at the next meeting (on April 7th), a paper would be read by Mr. Arthur Underwood, on "The Influence of Micro-organisms in the production of Caries."

## ODONTO-CHIRURGICAL SOCIETY.

AT the Ordinary Meeting held on February 14, ANDREW WILSON, Esq., L.D.S.Edin., President, in the Chair, a Paper, on a "New Mode of Treating Dead Teeth and Alveolar Abscess," by Mr. Walter Whitehouse, L.D.S.Edin., was read by the Secretary.

In the treatment of an upper molar, the cavity is roughly prepared and the pulp chamber cleared; a piece of very small platinum tube is taken, long enough to reach the masticating surface, with a small square of thin (No. 1) plate, soldered at one end, which re-forms, so to speak, the pulp chamber and commands the three fangs. The tube is exact size to admit the nozzle of the syringe, and if the nozzle is made hot and touched with the smallest particle of wax, it makes an air-tight joint. The tube is placed into position and the tooth filled with a white filling. When the filling is sufficiently hard, after the lapse of ten minutes, the syringe is half filled with whatever medicinal agent it is thought proper to use, the nozzle is inserted into the tube. Now, before any attempt is made to force its contents into the tooth, a slight attempt must be made to exhaust, and it is by the interchange of a portion of the contents of the tooth with the contents of the syringe, that the remedial agent can be carried to the apex of the tooth. The tooth having arrived at a comfortable condition, the tube may be sealed, and the whole allowed to act as a temporary filling for a few months. Carbolic acid, if used in greater strength than half a dram to two ounces of water, is irritant and escharotic, rendering callous the tissue it comes in contact with, the slough of which tissue acts as a foreign body, setting up irritation from its inability to be cast off. For the treatment of the class of cases we have under consideration, there is wanted a remedial agent that is disinfectant and non-irritant. Considering its power, carbolic is perhaps still the best, diluted to the above proportions with equal parts of glycerine and water—glycerine being soothing and readily absorbed. The objection to iodoform is its pungent odour, which lasts for an indefinite time, thereby excluding the possibility of ascertaining if decomposition is still going on by the delicate test of the odour on re-dressing. It is thought it deodorises, but does not disinfect. Sanitas is practically odourless, but he is of opinion that it is more irritant than carbolic. An extended trial would, Mr. Whitehouse thinks, prove glycerine and iodine to be most useful.

Mr. Macleod said that the only thing absolutely new in Mr. Whitehouse's method of treating alveolar abscess with a blind sac was the flexible trunk connecting the nozzle with the syringe. The use of the tube for the purpose of dressing the canals had in several forms been practised, but the combination of the flexible trunk with a nozzle which fitted tightly into the tube used was an advance in the right direction, and would enable the operator to secure an interchange of septic contents of the sac with the antiseptic or therapeutic agent used.

Mr. Watson did not think the syringe sent by Mr. Whitehouse had any advantage over the ordinary hypodermic fitted with fine flexible gold points, curved and straight, which can reach and be used in almost any pulp cavity.

Dr. Williamson did not think Mr. Whitehouse's method would supersede the ordinary modes of treatment, although theoretically it seemed to offer some advantages. He could not agree with the statement that sanitas was more irritant than carbolic, as he had used the former for more than a year, and the results had been negative of any irritating quality, using the pure oil.

Mr. Rees Price failed to see any very great novelty in the method and apparatus mentioned in the Paper of Mr. Whitehouse. He himself for a long time had used a small hypodermic syringe, with very fine flexible gold tubes, and he had found no difficulty in reaching the pulp cavity of any tooth with it.

The Secretary said that he did not approve of the churning process advised by Mr. Whitehouse in his Paper, as the syringe itself would, before being again used, require to be treated very carefully and rendered inocuous, if that were possible.

Dr. Smith said that allusion was made to certain cases where the complete removal of the disorganised pulp, although apparently a simple and easy operation according to many descriptions given of it, was in a number of teeth a difficult, uncertain, and sometimes impossible one to perform—at least with the resources at present at our command. Another point deserving of notice was the exact acceptation to be attached in this and many other dental papers of late, to the term "antiseptics." In the older sense of this word it meant certain substances which exerted a local therapeutic effect in modifying or diminishing or arresting putrescence, or perhaps even the discharge of offensive pus; but in the Listerian interpretation we must recollect that it is in reference to the germ theory that the term is used. Now, it becomes questionable whether in the treatment of any open sore in such a cavity as the mouth, the true Listerian principles can be carried out with effect at all, as each time the dressing is removed or access to the surface of the sore is had by the air, or exhalations, or fluids contained in such cavity, all the previous antiseptic precautions are at once undone. The remedial effect of these substances, however, as local agents, may correct morbid action therapeutically, and in this way prove beneficial; and he had no doubt this was what Mr. Whitehouse and others meant. The old method, which was a common practice more than thirty years ago, of inserting a strong thick bristle into the pulp cavity and stopping the tooth round this, and withdrawing it afterwards, was much on the same principle as Mr. Whitehouse's mode of providing an exit for any discharge.

Mr. MACLEOD states than he was experimenting with a weak solution of corrosive sublimate (1 in 1,000) as an antiseptic, and, so far, with decided success. Further experience by next meeting might enable him to speak more decidedly in its favour or otherwise.

## THE DENTAL MANUFACTURING COMPANY, LIMITED.

THE ANNUAL GENERAL MEETING of the Shareholders of this Company was held at the Company's Registered Offices, 3, 4 and 5, Little Windmill Street, Golden Square, on March 15th.

The Chairman (Mr. D. D. HEPBURN), in moving the adoption of the Report, which recommended a dividend of 5 per cent. per annum, said that if a little disappointment were felt by some at the recommendation of a smaller dividend than usual, a few moments consideration would convince every Shareholder of the wisdom of such recommendation, and that there was even cause for congratulation when the general depression in trade, and the interference to business consequent upon removal of the Company's Depôt, were considered.

It would be observed that the Stock was a large item in the Balance Sheet, but the utmost care was exercised to prevent the Stock becoming larger than was absolutely necessary for the business. The variety in a Dental Stock was very considerable, even in precious metals it was necessary to keep £700 or £800 in gold foils, cylinders, and pellets, there being upwards of 250 varieties.

With reference to the Company's publication, the DENTAL RECORD, it still maintained its well deserved reputation. The number of subscribers had increased during the year, and he sincerely trusted that every Shareholder would become a subscriber if not already so, and would send contributions to its pages, and by that means help to keep up its independent position.

Mr. GREGSON, in seconding the adoption of the Report, said that the declaration of a 5 per cent. dividend might perhaps be a disappointment to some; but, considering the general state of trade throughout the country during the past year, he thought they were singularly fortunate in being able to give the dividend they were, especially when they considered the careful manner in which the Stock and Accounts had been dealt with.

The expenses of the Company had been kept down in every way, and he felt sure that Shareholders would come to that conclusion in looking over the Balance Sheet.

Dr. CRAPPER supported the resolution, and referred to the exceptional expenses incurred, but, he said, it was found to be quite impossible to conduct the business in a thoroughly satisfactory manner in the old establishment, or to provide for any considerable increase.

Dr. WORMALD said, in reference to some remarks by Mr. Van der Pant, that the valuation of stock had been gone carefully into, and a reduction had been made which would have paid a 1 per cent. dividend. The Shareholders' discounts was a large item, and would have paid nearly 2 per cent. dividend on the paid-up capital. Dr. Wormald, in conclusion, called upon the Shareholders to support the Company in every possible way, as it was only by a thorough system of co-operation that the Company would become a still greater success, and pay larger dividends, than in the past years.

Mr. M. W. HALLIDAY thought the Company had every reason to be congratulated upon its present position; the general depression had not only affected them but also all other commercial concerns.

The CHAIRMAN then proposed the adoption of the Report, which was carried unanimously.

Mr. VAN DER PANT then proposed the re-election of the retiring Directors, Mr. D. D. Hepburn and Dr. Wormald, which was seconded by Mr. M. W. HALLIDAY, and carried unanimously.

Mr. LAWRENCE READ proposed a vote of thanks to the Chairman and Board of Directors, and said he thought the Company was fortunate in having Mr. Hepburn in the chair, that gentleman, having retired from active practice, had more time to devote to the interests of the Company. With reference to their own goods, the first consideration, undoubtedly, was the quality. Dentistry was a science which required the very best goods which could be had; no one would begrudge the litttle extra expense necessary to obtain an article properly made. Instruments, particularly, wanted to be carefully made, as they were used much finer now than formerly. His own opinion was that the Company's goods were excellent, and he was supported in this opinion by many of the Profession in London, who had expressed their entire satisfaction with the quality of the goods manufactured by the Company, and from this consideration alone he considered there was a very bright prospect before them.

Mr. HEPBURN, in reply, said that in the names of his fellow-directors and himself, he could assure them, as he had already done, that he would always do whatever he could to advance the interests of the Company.

It was very gratifying to hear from one of their London Shareholders, who came into contact with a great many members of the Profession, that the goods manufactured by the Company were appreciated. He could assure them that no efforts should be spared to help forward the production of first-class goods and as cheaply as possible.

The proceedings then terminated.

# JOURNALISTIC SUMMARY.

## DENTAL COSMOS (*March, PHILADELPHIA*).

"EMBRYOLOGY, with Special Reference to the Development of the Teeth and Contiguous Parts," by J. L. Williams, is continued from the previous number. This section of the article has particular reference to the development of the lower forms of life.

"RADICAL and Heroic Treatment of Alveolar Abscess by Amputation of the Roots of Teeth, with Description and Application of the Cantalever Crown," by J. N. Farrar. The writer does not advocate the operation as being practicable in the hands of all persons, or in the hands of anyone under all circumstances. Although a tooth deprived of a portion of its root and socket may not be so firm as it was before the disease set in, the amputating operation does not render it less so, but by proper subsequent treatment it may be made considerably more firm, thus rendering it useful for mastication as well as for preserving it for æsthetic purposes, to say nothing of the avoidance of an artificial substitute.

When it is possible to use the engine disc or circular saws, that is the most speedy method ; but when that is not practicable a screw-cut or file-cut engine-bur will do the work. In cases easily reached—such as the lingual root of an upper molar—a very excellent way is to drill a hole through the root and then plough each way from it with a fissure drill. After amputation the sharp corners of the stubb should be rounded off by means of a scraper or spherical bur.

The Cantalever Crown consists of a thimble-like cap which is fitted on to the decayed roots or crown of the tooth, being filled in with an oxyphosphate of zinc filling. This article has six illustrations.

"TREATMENT OF SENSITIVE DENTINE." This is an abstract of a Paper read before the Havannah Odontological Society in October last, by Dr. P. Calvo. If a small quantity of the oxide of calcium be placed in the cavity of a tooth it immediately produces a painful sensation, which, however, is of short continuance. When the pain has ceased it will be found that the surface of the dentine has lost its sensibility, but on removing the upper layer of dentine we find again marked sensitiveness. The writer has repeated this experiment many times, always with the same result, and always, so far as he can judge, without injury to the pulp. The pain which is produced by its application is doubtless due to an increase of temperature caused by its hydration ; but the quantity used being very small does not create sufficient heat to affect the pulp injuriously. The cavities are carefully dried before the lime is introduced, and they are thoroughly sealed to prevent the entrance of the fluids of the mouth. With these precautions he has been successful in excavating the most sensitive cavities without any pain whatever.

"SYPHILITIC TEETH." This is a continuation of a translation from the French of Alfred Fournier from the previous number. After some further remarks upon dental erosions the author deals with the question of micro-dontism (small tooth), dental amorphism, and vulnerability of the Dental System. Though the most important and most common manifestations that hereditary syphilis show upon the Dental System have been considered, the subject is far from having been exhausted. Among a number of interesting peculiarities which are noticed the author refers to a white milky stain which, under the form of a linear stripe, runs horizontally over the crown of a tooth, not—as in erosion—a loss of substance, a groove cut in the tooth, but simply a white streak, without irregularity of surface; it is purely and simply a dental zone, different from the neighbouring parts by its particular colouring. Its most frequent seat is the pair of central superior incisors, affecting them in a symmetrical manner. These streaks are not to be confounded with those simple white spots which are so common on the teeth in the form of little round or oval marks, circumscribed, placed at random, etc. These latter carry with them no diagnostic significance, and are foreign to the subject. Doubt cannot be entertained as to the pathogenic relation of these streaks with hereditary syphilis, though syphilis is not the sole cause of its production, yet he declares that it is the origin of it in a number of cases, and that in a very manifest manner. In a number of patients the incisors, especially of the lower jaw, are widely distant from each other. These distances are not always owing to the fact that the teeth, more or less reduced in volume, leave intervals between them proportionate to their small size. They have their origin much more frequently in the vicious separation of the alveoli—that is to say, in the bony malformation.

"The Report of the December Meeting of the New York Odontological Society" occupies over 20 pages, the subjects of discussion being: "Premature Removal of the Temporary Canines;" "The Use of Aromatic Sulphuric Acid in Necrosis," and the "Electrical Properties of various Filling Materials."

### ITEMS OF INTEREST *(March, PHILADELPHIA).*

"Is Inorganic Matter Used as Food Assimilated?" by Dr. J. F. Sanborn. The author asserts that it is not, and chloride of sodium is mentioned as an example.

"Dentition," by C. S. Chittenden. For the last twelve years the writer's practice, to a great extent, has been among the Scotch, whose special article of diet, at least for breakfast, is unbolted oatmeal. He has found that the teeth of children brought up on this food are erupted with very little difficulty, are less liable to decay in childhood, and, from the fact that they remain in the mouth till the absorbents have carried the fangs away, the second set are more regular than the teeth of the natives of this country (America). His practice is never to extract a deciduous tooth unless there is an actual necessity for it; and he never considers that there is a necessity, unless a permanent tooth is about to make its appearance, or there is disease which renders the tooth too painful to be retained in the mouth.

"Dental Fees" is a short extract from an essay by Dr. Cahoon.

"An Oversupply of Dentists," by Dr. Henry S. Chase, is an article taken from the *Missouri Dental Journal.*

"Air Chambers Again," by I. N. Hedgen. The writer thinks all air chambers are hurtful, cruel, and unphilosophical. He has worn artificial dentures for many years, and he knows from experience, as well as observation, that chambers never help, but make plates fit worse. The *plan* he has practised for the last ten or twelve years is as follows:—I take the upper impression in wax and harden it in cold water, then trim off as far back on the palatine impression as the plate is allowed to go, and let it go back as far as will be pleasant.

Next, I cut a large chamber about one-sixteenth of an inch deep, and so as to cover the whole of the arch, except to within the eighth of an inch of the centre of the gum all round (except in front—here I allow a little more margin, and also at the back part). I have holes in my plates, and make holes through the wax to let the surplus plaster escape. I now use tolerably thin plaster and press it up hard, say at least ten pounds pressure, especially at the back part, and continue the pressure until the plaster is hard enough to take out.

In this way we will have the pressure of the plate where we want it —on the palate and on the gums, and hence the plate will not rock or ride on the centre in mastication. This plan will not produce mechanical inflammation. I am now wearing a gold plate that is decidedly the tightest fit I ever had, made in this way with a round groove cut in the plaster cast about the eighth of an inch in diameter across the back palatine wall. This made the parts a little sore at first, but soon recovered of that, and the membrane now covers the edge of the plate.

"THE CARE OF THE MOUTH AND TEETH IN INFANCY AND CHILDHOOD," by Dr. Charles Mohr.

"THE MANIPULATION OF OXY-PHOSPHATE." There is such a thing as too much painstaking and deliberation. In using the phosphate of zinc, some Dentists jeopardize their work by working too much. If it is a good phosphate, the quicker it can be brought to a stiff dough and packed in the tooth-cavity, the better. If you commence the mixing by using only enough powder to make a thin cream, you can then add powder rapidly till the whole is a stiff mass. You must not make it necessary to add more powder from the bottle to make the mass stiff, but have plenty on the slab. It should be immediately carried to the tooth and packed, *while its heat still shows the process of chemical union active.* If it is much worked after this, even to polish it, it is injured. And it should be left as nearly as possible in the contour desired; for any cutting, or filing, or scraping, after it has set, will make a true polish impossible, and cause the surface to imbibe moisture, thus favouring disintegration. Its own undisturbed crystallisation produces a peculiar gloss that is an almost impervious polish.

**THE INDEPENDENT PRACTITIONER** *(March, NEW YORK).*

"FERMENTATION in the Human Mouth: its Relation to Caries of the Teeth," by Dr. W. D. Miller. This article is reproduced on page 158.

"WOMAN" is the subject of an oration delivered before the American Academy of Dental Science last November, by Dr. N. W Kingsley.

"IS DENTAL CARIES A DISEASE?" by C. M. Wright. The writer concludes: Is Caries Dentium a Disease, or is it simply the result of Disease? And: What is the Disease that causes Caries?

"IODOFORM IN DENTAL SURGERY," by Dr. C. F. W. Bödecker. The great therapeutical value of iodoform is due to its antiseptic and anæsthetic properties. It has been observed that iodoform, in the form of powder, when applied to the mesentery of a frog reduces the migration of colourless blood corpuscles, which is not the case when an oily solution of iodoform prepared in the dark has been made use of, and the prepared frog has also been kept in the dark for several hours. Thus iodoform vapour paralyses and kills the white blood corpuscles. This action of iodoform in migration can be accounted for by the other property discovered by Binz, viz.: that iodoform, under the effect of daylight, is reduced in such a manner that iodine passes from the walls of the capillary blood vessels without perceptibly affecting them, while it paralyses and kills the white blood corpuscles which adhere to them. How iodine acts as an antiseptic has not been definitely settled, but it may be hypothetically explained that the free iodine combines with the hydrogen of the water present in every tissue; thus oxygen is set free, which in turn neutralises septic matter.

Dr. JOHN SMITH DODGE reports a case where anything sweet, when taken, gave rise to pain in certain teeth. On careful examination the only lesion that could be found was a minute crevice or fissure on the grinding surface of a molar. This was opened up and filled with satisfactory results.

"ELECTRICITY IN DENTAL PRACTICE" is the subject of an Editorial article.

### THE DENTAL REGISTER *(March, CINCINNATI)*.

"ON CERTAIN MICROSCOPIC ELEMENTS in Pulpless and Gum-Denuded Teeth in their Relation to the Filling of Roots and the Re-attachment of Gum Tissue," by Dr. J. E. Line. This was a subject of a Paper read before the Dental Society of the State of New York; and the dicussion which followed the reading of the Paper is also reproduced from the *Transactions* of the Society.

"WHAT IS MEANT BY NERVOUS PROSTRATION," by Dr. R. Botholow, is the subject of a Paper read before the Philadelphia County Medical Society in December last, and reproduced from the *Polychine.*

"ODONTO-PERIOSTEAL TUMOUR Simulating Pulp Fungoid," by Dr. J. A. Smith. These are notes upon a case of a fungoid growth of the dental periosteum occupying a carious cavity in a molar tooth which had existed for over three years, and had given rise to neuralgic pains. The tooth was removed.

### NEW ENGLAND JOURNAL OF DENTISTRY *(March, SPRINGFIELD)*.

"BACTERIA," by Dr. Charles S. Boynton. The article deals with the history of bacteria, and quotations are given from Burrell, Cohn and other writers.

"THE EARLY HISTORY of the Massachusetts Dental Society," by Dr. J. T. Codman.

"What is the TRUE HISTORY of the Use of the RUBBER DAM?" by Dr. W. T. La Roche. The writer produces evidence to show that he had, in several cases, used the rubber dam as far back as in the year 1857.

The Editorial Articles are upon "Another Word about Antiseptics," and "Hints to Writers."

### THE SOUTHERN DENTAL JOURNAL *(March, ATALANTA)*.

"THOUGHTS upon Some Questions Affecting the Professional Standing of Dentists," by Dr. L. C. F. Hugo. This article is continued from the previous number.

"WHY THE TEETH OF THE NEGRO HAS FAILED," by A. H. Hilzim. The writer attributes this failure to the difference in the food and hygienic circumstances of the negro. In the days before the war the slaves were fed on only the coarsest food, and that generally cold, their diet consisting mostly of corn-bread and meat, coffee, sugar, greens and potatoes. They were required to eat at regular hours, rose early in the morning, and retired early at night; they had plenty of fresh air and exercise. Since their emancipation, their nights are given to visiting, church-going, ball-going, and, in fact, to almost everything except rest. As to their eating, every spare time they get goes for sweetmeats of some kind, pies and cakes that are very indigestible; they eat only the whitest of bakers' bread, and drink whisky. These conditions, added to uncleanliness and a scrofulous diathesis, which a previous writer had alluded to, are recorded as the fatal agents at work.

"LETTERS from a Mother to a Mother on the Formation, Growth, and Care of the Teeth," by Mrs. M. W. J. Letter 16 deals with diseases resulting from decay of the teeth, as indigestion, neuralgia, consumption, septicemia, nervous disorders, and other affections.

# Editorial.

## GENERAL MEDICAL COUNCIL.

THE Medical Council is now holding its Thirty-sixth Session, having assembled on March 25th. The only Dental business was to consider the removal of two names from the "Dentists' Register." The Secretary of the British Dental Association requested, by letter dated December 27th, 1883, the Council to consider the question of erasure of the name of J. P. Murray and of A. A. Sadgrove; both names had been removed from "The Medical Register," but still remained upon the "Dentists' Register."

The Council resolved that, both persons having been found guilty of "infamous conduct in a professional respect," their names be erased from the "Dentists' Register."

The receipts from registration fees during 1883 amounted to £385 15s. 0d. The number of Licentiates in Dental Surgery admitted by the several corporations during the past year is as follows:—R.C.S.Eng., 20; R.C.S.Edin., 8; F.P. and S.Glas., 2; R.C.S.I., 22. The "Dentists' Register," 1884, shows that of the 5,296 Dentists registered 801, or 15·12 per cent. are L.D.S.; 22, or 0·41 per cent. have surgical qualifications only; and 4,468, or 84·37 per cent. have no qualification. There are four D.M.D. of Harvard and one D.D.S. Michigan.

## GOSSIP.

Mr. C. J. Boyd Wallis writes:—The following curious incidents which occurred within a few weeks upon an Essex farm may interest the readers of the Dental Record. A sheep gave birth to a lamb which has no fore-legs, and its head resembles that of a sea-gull—a very common bird on the Essex Marshes. The lamb is otherwise perfectly formed. A cow gave birth to a calf which has no trace of either a tail or eyes, and the anus is situate on the back, above where the tail should have been. A sow had a litter of pigs—ten in number—which were unusually small. The mother, disgusted, I presume, with her progeny, ate them all up, and immediately entered into a family arrangement with another sow having a litter of twelve pigs, in the same yard, by which she acquired half the family, and has since proved a kind and anxious foster-dam to the pigs of her adoption.

A man who represents himself as a Dentist's Assistant, and gives the name of G. H. Broadhurst, has for some time past been going about begging, and professing to seek employment, much to the annoyance of several practitioners. He has on different occasions, and without any authority, used the name of Dr. Crapper, of Hanley.

Mr. J. Dennant, L.D.S.Eng., having resigned the office of Dental Surgeon to the Royal Alexandra Hospital for Sick Children, Brighton, a position he has held since the commencement of the Institution, fifteen years ago, has been appointed Consulting Dental Surgeon to the Charity.

Mr. J. Holland, L.D.S.Eng. and Edin., has been appointed Dental Surgeon to St. John's Hospital for Diseases of the Skin, Leicester Square and King's Road.

At the Annual Meeting of the Manchester Microscopical Society, Frank A. Huet, L.D.S.I., and John W. Dunkerley, A.R.M.S., were elected members of the Council for the ensuing year.

Mr. Prosper Ladmore, L.D.S.I., having complied with the requirements of the College, graduated D.D.S. at the Pennsylvania Dental College on the 28th February last.

Mr. I. Lee Pike, L.D.S.Eng., has been appointed Dental Surgeon to the Children's Hospital, Sheffield.

Mr. Frederick Rose, L.D.S.Eng., has been appointed Dental Surgeon to the Liverpool Dental Hospital.

THE

DENTAL RECORD.

VOL. IV. MAY 1, 1884. No. 5.

# AN IMPROVED METHOD OF AFFIXING ARTIFICIAL TOOTH-CROWNS TO NATURAL ROOTS.

By A. H. BEST, M.D., L.D.S.I.

*(Concluded from page 99.)*

IT is a fact generally admitted that the various devices which bear evidence of superiority, and warrant a hope of anything approaching permanence, are beyond the mechanical ability of the average operator, while a want of time is a serious difficulty to those occupying the position of bread-winners, etc. Yet there are cases in which this class of work is indicated, and alas! in too many instances, a ruthless destruction of important dental organs supplies a deficiency or lack of ingenuity and skill to cope with the mechanical and practical, to say nothing of the financial and want-of-time difficulties that are frequently associated with such cases.

It is with a view of offering a few suggestions to the end of contributing to those resources which may enable the operator to overcome in some measure these difficulties, that I have been induced to lay the principles herein contained before the Profession.

I would not be understood to speak disparagingly of cement as a means of attachment, conceding, on the contrary, that very valuable additions to the dental arch can be made by its aid; but quite as much caution is necessary for its successful employment as mechanical ingenuity in the strictly non-plastic operation. Still, as caution is a cheaper element, and one that must, from the limited use made of it, exist in great abundance in nature, it seems economical to turn this, as it were, waste product to account, since by its means we are enabled to accomplish so much, by either method, in a creditable and moderately permanent manner. I am, however, not favourably impressed with any method of affixing tooth-crowns by plastic cements without any mechanical support, and therefore depending solely on the diligence of careless patients for those circumstances favourable to success.

It also seems that the attachment of a crown, wherein plastics are associated with mechanical devices, should be so securely effected by the construction of the latter, as to render any moderate strain to which the crown would be likely to be subjected before the setting of the plastics, a matter of no possible detriment; while after the cement has set, the straining of the tooth from its position should be a matter only possible at the expense of its pins or by the fracture of the porcelain itself.

A very general objection to the tooth-crowns on the market is their usual limitation to the six front teeth, and commonly very difficult of adaptation when made for any of the others. The quality of the amalgam employed for this particular purpose is also often questionable; and even when this is not the case, the coarseness of the alloy may be such that the cement does not adapt itself to all the irregularities of the tooth-surface, etc., so that the maximum support is not attained. Amalgam may also be easily and completely spoiled by using too much mercury. But these, and other obvious matters, will not be new to the experienced operator.

A hope to overcome most of these difficulties and to elaborate a system, practicable even by the ordinary operator, and yet combining the many desiderata which have been enumerated, induced me, after considerable study of the problem, to finally adopt, with very satisfactory results, the following methods:—

As the success of an operation of this kind depends largely upon the health of the root, to which the attachment is to be made, as well as upon that of the surrounding parts, it is of course necessary to commence by bringing about these favourable conditions if they do not already exist. Even when the root and gingival surroundings disclose, on inspection, nothing to lead to a suspicion of acute, or chronic periosteal inflammation, it is nevertheless preferable to justify the proceedings by first applying the following test—Ascertaining by a bristle-probe the length of the nerve canal; clear out this canal, and enlarge it as far up as possible, stopping about $\frac{1}{16}$ of an inch short of the apical foramen, which ought not to be enlarged. This precaution is rendered easy by the previous sounding with the probe. Having enlarged the canal in the manner and to the extent desired (the object being to facilitate the removal of foreign matter and make room for proper medication), it is to be thoroughly packed with carbolised cotton-wool or floss-silk; it should then be hermetically sealed with gutta-percha or cotton and mastich, and the patient dismissed for twenty-four hours. If no signs of irritation are apparent at the next visit, we may reasonably assume that the root and surroundings are sufficiently healthy for proceeding with the operation. On the contrary, should irritation follow this treatment, we must resort to the usual abortive or palliative treatment employed in such cases, and persist therein until perfect health is restored; the reasonable permanence of which condition we should place beyond the possibility of a doubt, by again hermetically sealing the root and dismissing the patient for a week or ten days, when, if no irritation has resulted or is manifested by the usual mode of examination, such as percussion, pressure, etc., we may reasonably hope that conditions are favourable to a consummation of the operation.

We will now begin by cutting down the end of the root to the margin of the gum, on both the labial and lingual aspect. A corundum wheel, of sufficient size for its convexity to correspond to the festooned concavity of the gum, may be used for bevelling the labial border of the root, thus reducing it to a line or so beneath the free margin of the gum; this preparation enabling us to conceal the joint by admitting the cervical portion of the tooth-crown beneath the festoon of the gum. The lingual aspect of the root need not in all cases be cut down to the margin of the gum, as it is only necessary to do this where a band is made to fit the neck of the tooth; in this case it would be necessary to reduce the stump to a level beneath the free margin of the gum in order to rid it of that swell where the enamel terminates (known as the cingulum), which, if allowed to remain, would much endanger the permanence of the design, since it is larger than the cervix, which the band is intended to fit. Such precaution will not be necessary when using the first method to be described.

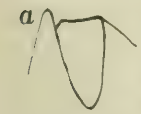


Fig. 1.

The root thus prepared will now present an appearance very similar to Fig. 1, which represents the side view in which *a* indicates the labial margin bevelled as above described.

The next step is to enlarge the orifice of the canal as far down as practicable, and shape it for the reception of filling material—two precautions being specially observed: not to weaken the tooth-structure too much by inordinate enlargement, and by no means to make the cavity perfectly circular, as by a drill or burr, since the crown must not have a chance to turn in its socket, thereby loosening its attachments. We must remember to leave enough solid tooth-bone below the enlargement of the canal, to sustain the subsequent manipulations of securing the pivot. When these preparations are concluded, the root will generally resemble the outline presented by Fig. 2, with a distinctly oval cavity. It is frequent for operators to bevel the end of the root to a feather-edge from the canal outward. I consider this practice mistaken, as it seems that a recurrence of caries is greatly favoured by this extreme tenuity, which must necessarily lower the vitality of the part to a corresponding degree. The cross-section shown in Fig. 3, indicates the especial care that has been taken to avoid this difficulty. It will also be observed that neither grooving nor undercutting have been resorted to, the same results being attained by gradually and smoothly enlarging the cavity below the orifice of the

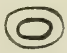


Fig. 2.

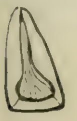


Fig. 3.

canal enlargement, both in its labial and lingual aspects—the fixture being found to be thus most securely retained with the least detriment to the living attachments.

We now come to the final step in the preparation of the root, *i.e.*, the affixing of the pivot stud. I will anticipate a little by mentioning just here that I prefer a screw-pivot of the largest diameter and strongest composition admissible in this class of work, the size with special reference to the diameter of the root, and the composition depending of course on the position and duty to which it is assigned.

As a preliminary to the operation, I recommend the operator to provide himself with three sizes of drills, and taps and pivot-screws to correspond. This outfit covers most reasonable emergencies, and will usually be found all-sufficient.

Having provided all that is necessary, we now ascertain the length of the root by passing a nerve-bristle through the apical foramen, the contact with the soft parts at the apex will indicate when to stop. Then kink the bristle at the exposed end, so as to secure a gauge for future reference. It may be found impossible to pass the bristle *through* the root: in such cases an effort must be made to get it as far up as possible, in order to utilise the maximum retaining depth; and it is proper to bore up the nerve canal, very gently, using a small spindle-shank spear-drill, and hand-power only, continuing until slight sensitiveness announces your close proximity to the apex. The depth of this cavity, to be measured, as before, with the bristle, may be taken as a limit, just short of which the canal may be safely enlarged for reception of the screw-stud.

It is convenient to describe in this place the preparation of the tooth-crown, which in practice should be completed in the early part of the operation, unless we keep an assortment of prepared crowns on hand, from which we may select the one that best suits the requirements of the case.

The crown consists of an ordinary plate-tooth, prepared for use by soldering two loops or rings of platinum wire to the pins. Of these loops the one nearer the cutting edge of the tooth must correspond in size to the stud; the lower loop or that one on the cervical end should, for easier adjustment, be twice or thrice as large.

Another very convenient form of tooth-crown, adaptable to this kind of work, is known as the "How" four-pin crown. These pins can be brought together and soldered so as to conform to every requirement, and from their special construction will be found easier of adaptation, though in point of strength slightly inferior to the plate-tooth. The soldered loop, which cannot be forced out of position, forms the special feature of the contrivance.

The tooth-crown having been selected and fitted to the gingiva border, and everything being ready for a consummation of the operation, it is proper, when practicable, to begin by placing on the rubber-dam—a very easy matter if one has a clamp for that purpose. As efficient clamps are not always at hand, the following simple and convenient method of preparing one will no doubt be acceptable to many:—Take a piece of spring brass, silver, gold, or any convenient metal, about one and a-half inch long by one-quarter wide $(1\frac{1}{2} \times \frac{1}{4})$; bend the ends so that they will conform to the circumference of the root; then bring the ends together, U shaped, bending the spring in the middle, bringing the ends close enough together for the spring to close the clamp on the root. It is adjusted by placing one end in position, and springing the clamp open until the other end comes to the other side of the root then pressing the clamp on. It retains itself perfectly, and is neither large nor cumbersome.

The clamp being in position and the rubber-dam perforated for the reception of the root and two or three teeth on either side, it is passed over the clamp and forced down around the root and on the adjoining teeth. The bridle is then adjusted, holding up the corners, and, when necessary, weights are affixed to hold the lower corners down. The dam is then forced under the gum, together with a silk ligature, which is tied securely above the clamp. The next step is to free the dam from the clamp, which is accomplished by passing a blade burnisher around the latter. We can now remove the clamp and dry the cavity.

A screw-stud, adapted in size to the diameter of the root, is selected, with drill and tap to correspond, and the canal is enlarged, using, of course, the special drill just mentioned, to the depth admissible, as indicated by the kinked bristle gauge to which I have repeatedly referred, as a convenient means of keeping the limit of excavation continually in sight.

To facilitate the adjustment of the tooth-crown, the drill should be held so as to operate in the axis of the root; exact observance of this precaution being of great importance. It is advisable to go as far down as the depth of the canal and the size of the root will permit, endeavouring to reach the happy mean betwixt too great weakening of the support on one hand, and neglet to improve available depth on the other.

The pivot-hole being drilled, the chips are cleared out with an air-syringe, and the depth attained is measured; the tap is then gauged, in order to avoid straining the threads. For the same reason special attention should be devoted to the task of cutting the threads, it being in general preferable to stop short of completely threading the canal, rather than to take the risks involved in a half turn too much. The tap is to be gently backed until it can be extricated without using force, and the *débris* again removed by means of the chip syringe.

The apical foramen or the remnant of that aperture which is accessible, must now be filled with gold, taking care not to force the material through the opening into the soft parts beyond. This precaution is made easy by having on hand an assortment of nerve-canal pluggers, of sizes ranging from the smallest to a conveniently large size. By comparing the smallest plugger with the bristle-gauge before alluded to, or if this has not been preserved, with a remeasurement of the canal depth, we may determine whether the length would permit this size to pass beyond the foramen. It is next tried in the tooth, and if it passes through is laid aside, and the next size examined, and so on until one is picked out that will not pass through the foramen, but rest firmly when it has reached withing $\frac{1}{32}$ of an inch, or thereabouts, of the soft parts, immediately connected with the aperture, as indicated by the gauge.

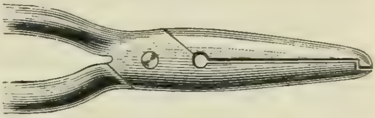
Should the exact size not be at hand, the remaining portion of the canal may be very carefully enlarged until sufficient depth is attained to enable the plugger to reach the point desired, or the tool may be reduced to the desired size; it is, however, obvious that but a slight adjustment can be made in the former way, hence the operator should assure himself before commencing that he will not require much, if any, of this hazardous adaptation.

In other respects, when the instrument is fitted, the apex of the root may be filled without any danger of driving the gold into the soft tissues, a security which is well worth the trouble of selecting the tool.

The apex being filled, the screw stud is now adjusted by being screwed gently into position, the depth to which it is possible for the pivot to go having been previously ascertained by reference to the tap or remeasurement with the bristle: this precaution renders the straining of the threads in the dentine less probable than when the stud is simply screwed in without such observation. Any convenient contrivance may be employed to adjust the pivot in position; but a pair of what I call chuck-pliers will be found, on the whole, the most unobjectionable. These are constructed so that the grip of the beaks is controlled by a ring sliding on the handle, permitting the operator to release the stud without straining its hold on the root; a consideration of no little importance to the success of the operation.

The next step is to fit the crown in position. The wire-loop slips over the screw stud, and the cervical end of the crown rests against the bevelled end of the root. Such alterations as may be necessary to secure accurate adaptation will suggest themselves, and may be made in the usual manner. I may say that there will almost always be a slight difference in direction between the axis of the crown when in position and the line that axis was intended to occupy. In such cases the screw stud requires to be bent to accommodate the crown;

and this is accomplished, without detriment to the threads cut in the dentine, by the aid of a pair of pliers of special construction, with beaks sufficiently small to render them convenient to use in such places, yet strong enough to bend the pivot as may be desired. I have found the form illustrated adaptable to all ordinary purposes.


Snipe Nose, Fig. 4.

When the crown is fitted, the next step is to fill accurately the root around the screw stud with some good, reliable, moderately quick-setting amalgam, packed quite hard. The tooth-crown is separately filled with soft amalgam, under the lower staple, and slipped into position; when down far enough to be flush with the end of the root, below the margin of the gum, it is pressed back, the soft amalgam being thus forced among the screw threads of the pivot. The staple nearest the cutting edge is now pinched on the pivot with a pair of pliers, the one nearest the cervix being large is caught with a convenient instrument and twisted tight, although not so as to strain or dislocate either attachment; lastly, amalgam is forced into the little loop of the staple, remaining beyond the pivot, and this additional bond greatly assists in holding the crown in position.

This system, subject to slight modifications to suit particular cases, may be employed at any time, no model or previous fitting being necessary, and gives at comparatively small expense of time a degree of strength quite beyond what can reasonably be expected from many devices of more delicate construction. Besides the great advantage of rapid fitting, it has also that of convenience; as drills, taps, and screw pivots are all that have to be kept on hand, excepting, of course the crowns themselves.

## NOTES FOR STUDENTS.

By the Editor.

*(Continued from page 6.)*

### STUDENTS' DIFFICULTIES.

*(A Paper read before the Students' Society of the National Dental College.)*

Difficulties are encountered by every one in the many phases of life. The child's experience is studded with them; the young man's attempts often result in failure, more or less; and the old man, in his downward march, is frequently reminded of his inability to accomplish with the ease of former years many actions of which he was proud. It will be apparent that the subject of Difficulties has a broad and general aspect, but it is rather with a special bearing of the question that I would on this occasion engage your attention. I, therefore, shall consider some of the Difficulties that the Dental Student frequently meets, and offer some suggestions as means of overcoming such impediments to progress; yet, it must be observed that, by stimulating to increased effort to surmount them, Difficulties not infrequently are causes of increased proficiency.

On entering upon hospital work the student is at once beset with Difficulties. There are new surroundings, fresh experiences, strangers on every hand, teachers, fellow-students, and patients. These conditions collectively, and almost individually, produce an atmosphere or environment that embarrasses the "fresh man." But time, which brings experience, dispels those shackles. Yet there cannot be any more efficient means to overcoming those Difficulties than attending the meetings of a society like this. At such gatherings fellowship is promoted, ideas are ventilated, experience recorded, opinions expressed, crochets rubbed down, and knowledge gained.

The Student, when treating a case for several days, has the opportunity of asking different members of the staff for advice upon it. He does so, when, perhaps, A tells him to use strong carbolic, B eucalyptus, C arsenic, D tannin; or, in treating a regulation case, he may be told by A to extract a lateral, by B a canine, by C a bicuspid, and by D a molar. The differences of opinion thus expressed tend to produce confusion in the mind of the Student, and he finds difficulty in knowing what to do—which line of treatment to adopt. He is disposed to think that there must be something wrong when he hears such diverse views set forth, and he fails to appreciate the benefits of the teaching which includes so much disparity. Difficulties of this nature are overcome if the Student recognises the fact that the entire conditions of the case are very concrete—that the general state of the patient's health, the general character of the mouth, the special circumstances of the particular tooth, the aptitude or assistance of the patient, the distinctive peculiarities of each operator, and the details of the *modus operandi*—that these and numerous other complexities are the principal factors which give rise to the various opinions upon a single case, that even educated and experienced practitioners express. Then, secondly, let him in one case adopt one of the plans recommended, and in another instance practise another method of treatment, carefully observing with which mode under all the several conditions he is most successful. Thus the difficulty of knowing what to do under such circumstances will disappear, and the Student will have the benefit of being acquainted with different lines of treatment to bring about a successful issue.

It appears difficult for Students, especially at the early part of their career, to work with small instruments. As a rule, they buy too much iron, and their excavators and burrs are generally too big. The consequence is that there is often too much tooth substance sacrificed in preparing small cavities. Particularly is this the case in opening up fissures in molar teeth. The majority of fissures require only sufficient cut away to permit the filling material being thoroughly inserted; yet observation constantly indicates that this is a common fault, and, to avoid it, a Student's Difficulty.

To get the pulp out of the roots of molar teeth is frequently a Difficulty to the young Student. In those cases he does not sufficiently open out the pulp chamber. The sacrifice of tooth substance is required rather within the body of the crown than at the expense of the strong grinding surface. Access to the canals should be direct, and not past sharp corners and angles. Though the barb may be got into the canals, the pulp substance has to be got out; and in withdrawing the barb past a corner of the chamber the pulp, which has been caught, will most likely be detached from the instrument.

To gain proficiency in doing operations of the mouth it is best to be deliberate and sure; but there is a disposition prevalent to continue that slowness in operating long after a high degree of manipulative ability has been attained. To overcome this tardiness in getting through the work seems to be a Difficulty. It is when the Student goes to private practice, and especially as an assistant, that this shortcoming is most detrimental. Therefore, so soon as good work can be accomplished, dexterity or rapidity in operating should be the Student's next aim. The necessity for delicate and rapid manipulation in operative Dentistry cannot be over-estimated.

There is one Difficulty which frequently besets not only the Student, but also the fully-fledged practitioner—that is, to secure sympathy between the operator and the patient. In some instances there is so marked an evidence of the absence of sympathy—almost amounting to a repelling influence between the two individuals—that the Dentist has neither pleasure nor interest in his work. He would rather he never saw that patient. On first meeting a patient there is an inexpressible anxiety as to this peculiar harmony of feeling. Occasionally you are met with considerable reserve and reticence, which hangs, as it were, in a balance, easily turned for or against, and by courteous demeanour and affability the operator wins the confidence of the patient and secures that mutual concordance of feelings or sympathy which is a valuable aid to accomplishing good work.

The foregoing are only a few of the Difficulties that the Dental Student frequently encounters. Many more might be enumerated, but one principal object will have been attained, and perhaps some good may accrue if, in any instance, there be fully recognised the value of the underlying common antidote to those Difficulties—Industry. Success is more easily achieved by some individuals than it is by others, but where there is exercised a determination to progress a measure of success is sure to follow.

# ELECTRICITY: AND THE ELECTRIC LIGHT: IN REFERENCE TO DENTISTRY AND SURGERY.

By C. J. Boyd Wallis, L.D.S.Eng., &c.

## Part IX.—Batteries—*Continued.*

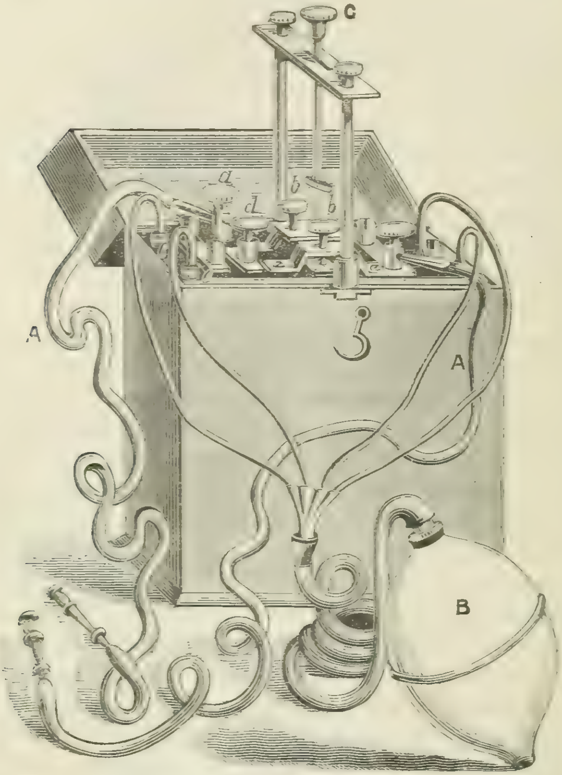
Parkhurst's Battery.—Was designed by C. D. Parkhurst, of Fort Mckinney, Wyo., U.S.A., to effect the rapid depolarisation of the negative plate. The positive plate is made of zinc; the negative plate, which is of carbon, is placed in a porous cell and surrounded with a mixture of granulated gas retort carbon, granulated black oxide of manganese, and chloride of mercury, equal parts. These materials are intimately mixed together with a small quantity of water before being placed around the negative plate. On account of the corrosive nature of the fluids of this battery, the upper end of the carbon is saturated with paraffin, and the electrical connection is made with it by casting lead or solder around it, and attaching to it a binding screw. The amalgamated zinc rod and the porous jar are placed in a suitable vessel, which is then filled up with a saturated solution of sal-ammoniac. There is no internal action in this battery when the circuit is open; the circuit being closed, decomposition commences. The zinc is oxidized by the water of the sal-ammoniac solution forming oxide. This zinc oxide immediately re-acts with the sal-ammoniac (chloride of ammonium), first combining with a portion of the chlorine of the latter (and displacing an equivalent of ammonia) and then combining with another portion of sal-ammoniac, forming ammonia zinc chloride, while the ammoniac becomes converted into ammonia. The hydrogen being liberated at the negative plate, unites with its equivalent of oxygen from the peroxide of manganese, reducing this to the sesquioxide, and by this union forming water. The ammonia reduces the calomel into metallic mercury and hydrochloric acid, which latter unites with the ammonia, forming ammonium chloride, to be decomposed, as above described, or this latter acid may act directly upon the zinc, thereby intensifying the action of the battery. Thus is seen the advantage of the use of calomel, as by its use the ammonia, which previously was a waste product in this class of batteries, is made to play a part in intensifying the action of the battery, and rendering it practically a constant battery, well adapted for medical, telegraphic, telephonic, and other purposes where a constant current is required, and an open circuit is the rule.

### Medical Batteries.

The great progress which has been made during the last few years in the scientific application of electricity for the relief and cure of disease of the human frame has led to the invention and introduction of a number of batteries for medical purposes, which are perfectly constructed, and are a very great improvement on the older forms, both from a scientific and artistic point of view. Of these the obsolete types will be passed over, and only those which have professional recommendation will be noticed.

BYRNE'S BATTERY.—This battery was invented by Dr. Byrne, of Brooklyn, U.S.A., and is extensively used in medical practice in the United States. Each negative element in this battery consists of a copper plate, on one surface of which, as well as to its edges, a compact sheet of platinum foil, free from pin holes, is soldered, and to the opposite surface or back a sheet of lead, the three metals being so united that the copper shall be effectually protected from the action of the acids. The lead back and edges are then coated with asphaltum varnish, acid proof cement, or any similar substance ; and, finally, the platinum face is thoroughly platinised, after being previously rubbed over with emery paper. Each cell of the battery contains two of these plates, and between them the zinc element is suspended, and when the elements are emersed so that the exciting fluid reaches within an inch of the top, a negative surface of 20 square inches is brought into action. The platinum alone is the negative metal, the copper core acting merely as a conducting body, while the lead, being almost passive, serves only to protect the copper; therefore, any other, and, best of all, a non-metallic substance capable of resisting the action of the bichromate solutions, might be substituted for the lead with advantage. To keep the metallic surfaces constantly clear the exciting fluid in this battery is agitated. This is accomplished by means of an elastic air-forcing bulb, which is connected with a series of air pipes extending into the fluid. In this battery, Fig. 24, A A are conducting wires ; C, suspension rod and set-screw combined, to connect between second and third cells in series ; a a, poles of battery ; b b, two set-screws to couple for quantity ; d, an extra binding post, not essential, but convenient when two cells only of the battery are required ; e e, air tubes. The exciting fluid consists of sulphuric acid 1, water 5 ; to each pint of this solution 2 ounces of bichromate of potash are added ; chromate of calcium will give a higher E.M.F., and, consequently, a much greater thermal power. The fluid should not exceed 7½ to 8 ounces in quantity for each cell. To connect the battery for intensity, turn down C firmly and raise b b ; and for quantity reverse the operation by turning down b b firmly and releasing C from its contact with the lower metallic connection. The pneumatic agitator should be worked by quick and short compressions of the bulb, and not by slow or prolonged compressions. When the battery is not in use the elements should be drawn from the solution. This battery is portable, easily managed, and certain in its results ; it is invaluable for surgical purposes, and is extensively used in medical practice in the United States. In galvano-cautery, particularly during certain difficult and complicated surgical operations, the simple means of changing the entire character of the current to meet emergencies is of the utmost importance.

Fig. 24.



A more simple and powerful arrangement of this battery may be made for laboratory purposes consisting of from six to ten earthenware cells, quart size, with three plates in each cell, two platinised plates, and one amalgamated zinc between them, all being secured to a wood or ebonite frame attached to a windlass by which they may be raised or lowered into the cells. The battery may be supplied with a current of air by means of a Fletcher's foot-blower.

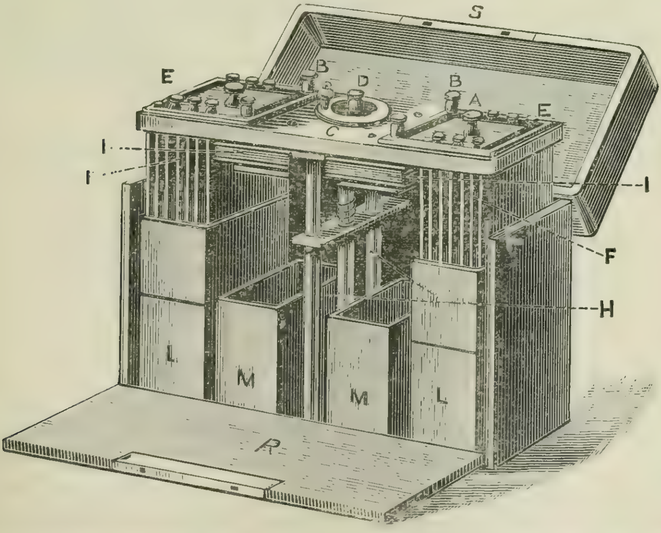
The air disturbance of the fluids has no effect upon the electromotive force of the battery, but the volume of current given off is enormously increased, and this is in part due to the low internal resistance of the cell as well as to the free circulation of air through the fluid. A battery of six cells will yield a light equal to that given by a

20-cell Bunsen or Grove. With a battery of 10 cells, a platinum wire, 32 inches long, of No. 14 gauge (·089 inches in diameter), was gradually brought to a glowing red heat, which ebbed and flowed with the cessation or renewal of the air-flow. Mr. Spottiswoode, F.R.S., in his laboratory at Sevenoaks obtained from a battery of 10 of these cells effects which would have required from 60 to 70 Grove or Bunsen cells to have produced.

*To platinise* the platinum element place a porous cell in an earthenware vessel and fill both with an acidulated water; connect a piece of zinc by means of a wire to the platinum plate and place the zinc in the porous cell, and the platinum in the outer cell, and, while stirring, put into the outer cell a solution of chloride of platinum in water, adding drop by drop, with agitation, until the platinum surface turns a dark colour, and acquires a granular deposit of platinum. If the chloride does not deposit well, dip only a portion of the zinc in the solution at first, and increase as the coating is seen to form. The plate should then be dried, and handled carefully so as not to disturb the deposit before it is well secured by the drying.

CHARDON'S BATTERY was introduced (1883) by Mons. Chardon, a French manufacturer of medical electrical apparatus, for the practice of galvano-cautery. In this apparatus, Fig. 25, the elements are inclosed in an easily transportable case, and are so constructed as to prevent the danger of spilling the fluid.

Fig. 25.



This battery consists of a box, whose cover, S, and one side, R, are hinged, and within which is fixed a metallic support formed of three vertical columns united at their upper extremity by a horizontal crosspiece. Into the middle column, which carries a thread, enters a screw, while into the other two, which are smooth, enter two cylinders, H, that act as slides. This screw and these slides support, by means of a properly arranged device, a wooden tablet on which are fixed all the pieces that are necessary for the working of the apparatus. The head of the screw traverses this tablet and terminates in a wheel, C. Thus it will be seen that the tablet, which also carries the elements, may be raised or lowered, as required, by turning the wheel, C. To this tablet, at the extremities, are fixed the zinc and carbon elements, three of the former with four alternating carbons at each end. The elements are so arranged as to leave room for two thick sheets of rubber, I I, and four ebonite cells of different heights; those (L) containing the exciting liquid (solution of bichromate of potash and sulphuric acid) being nearly as high as the external case, and the others, M, being about half the height.

When required for use the tablet is lowered by turning the screw and the elements descend into the cells, L, which are half filled with liquid. The intensity of the current may be regulated by the depth to which the elements are lowered. When the battery is out of use, and to be transported to a distance, the respective positions of the cells, L and M, are reversed, and on again lowering the tablet the sheets of rubber, I, are pressed against the edges of the cells containing the liquid with sufficient firmness to hermetically cover them, whilst the fluid dripping from the elements is caught in the troughs, M.

The elements are about 14 centimetres square, and are coupled for quantity, in such a manner that two sets of large surface are obtained; and they are, furthermore, arranged so that one set or the other may be employed at will. Or, on the other hand, the elements arranged for tension may be used by attaching the conducting wires to one of the terminals of each set of elements, communication being established by a wide band of metal. The carbons are platinised, and are invested with a layer of copper at their upper end to which is soldered the strip of metal that unites the four carbons of each cell to form a single element.

This battery is in use in several of the Hospitals in France and Belgium.

MAW, SON, AND THOMPSON'S BATTERIES.—The following are illustrations of batteries manufactured by Messrs. Maw and Co., of Aldersgate Street, E.C. These batteries are excellent specimens of the cabinet-maker's art, they are beautifully finished, and skilfully and scientifically arranged, being based on designs of some of the leading electricians of the day.

Fig. 26 is an improved battery composed of 20 *Bunsen's* cells for constant and induced current.

Fig. 26.

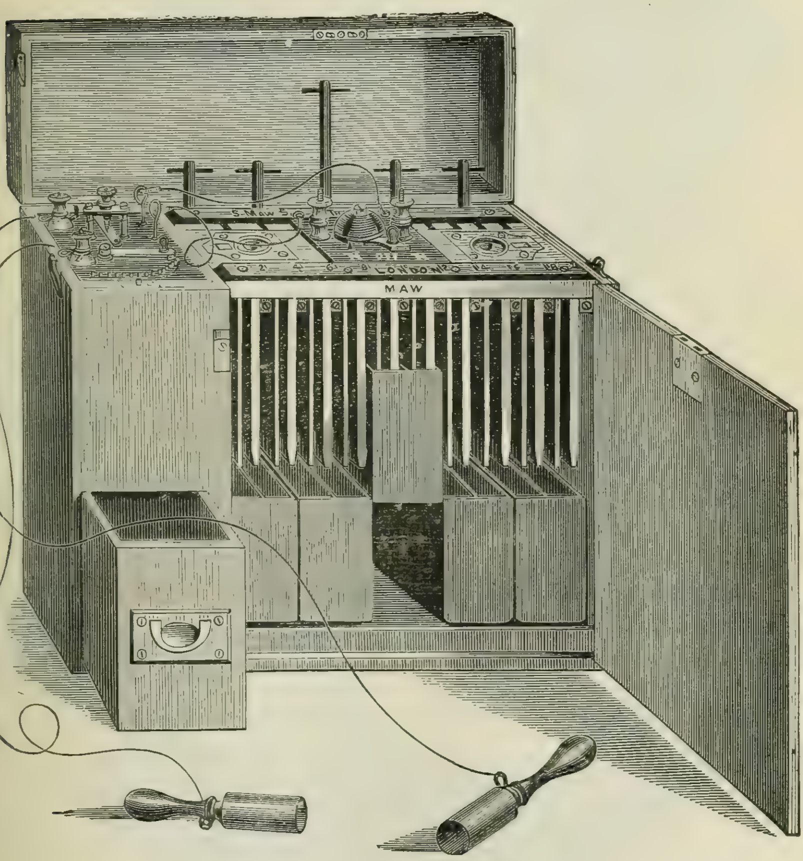
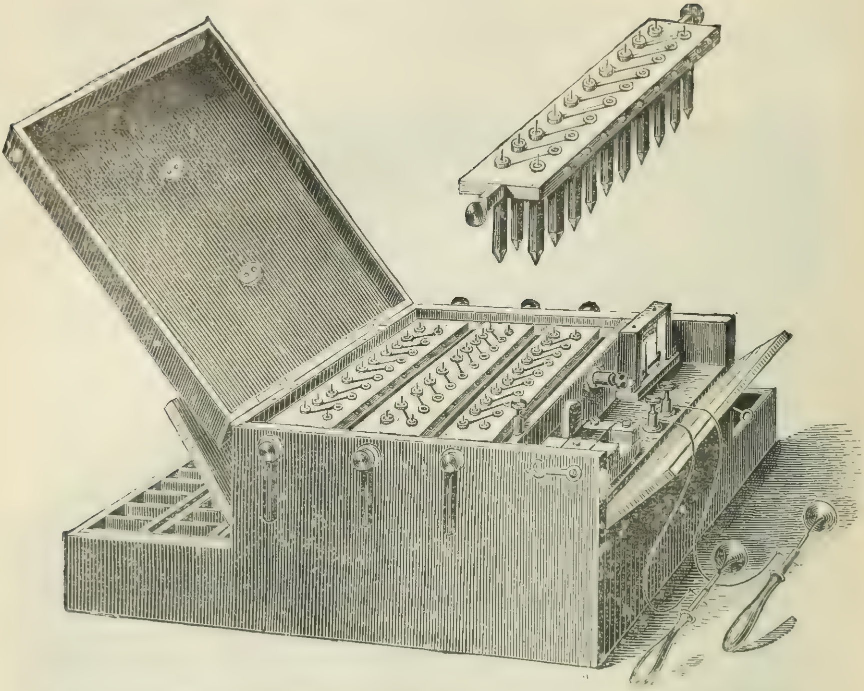


Fig. 27 is a *Spamer's* battery of 32 cells for producing a constant current. It has a galvanometer attached for the measurement of the electric current, and the cells are so arranged that one or more sets of them may be brought into action as required.

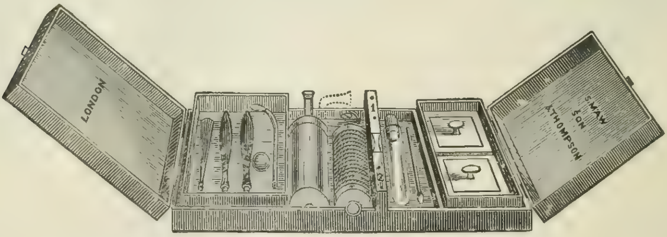
Fig. 29 is a *Gaiffe's* pocket *bisulphate of mercury* battery, with apparatus for induced current. It consists of coils with graduating tube in the centre, a partition with electrodes, and a block for the attachment of rheophores. The battery consists of two cells formed of vulcanite troughs (seen to the right of the illustration), a plate of carbon is let in at the bottom, and the zinc is in the shape of a moveable cover. To charge the battery a spoonful of the bisulphate of mercury, contained in the bottle with which the apparatus is fitted,

Fig. 27.



is put into each cell, with a little water. Thus charged the battery will work for about an hour. A smaller quantity of the mercuric salt

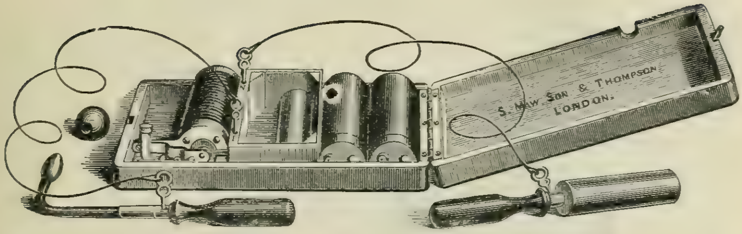
Fig. 28.



may be employed when the battery is required for a shorter period.

Fig. 29 is *Gaiffe's chloride of silver* battery for induced current. It consists of the coils, two cells, and the accessories, all of which are contained in a rectangular box of a neat and portable size. To the right of the figure are seen the two chloride of silver cells which are retained in position by two springs that serve, at the same time, as the connectors between the battery and the coils; to the left is the coil fitted with a brass draw-tube for regulating the intensity of the current; to the extreme left of the figure is seen the lever by which the vibrating hammer is regulated so that any degree of tension of the spring may be obtained, and the rapidity of the intermissions

Fig. 29.

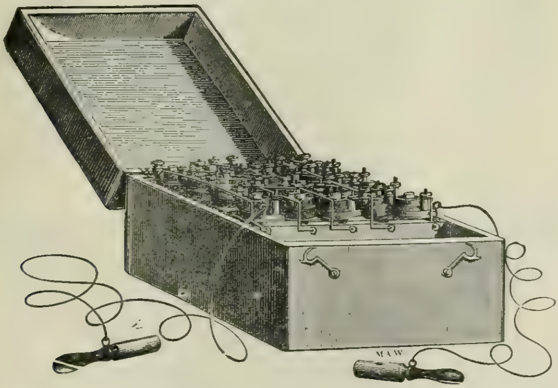


governed. On the upper surface of the partition, N, P, are the extremities of the wires of the coils, and into holes in this surface the free ends of the conducting wires are inserted, whilst to the other extremities the rheophores are attached.

The elements are a strip of zinc, and a strip of fused chloride of silver; these are contained in an ebonite cell hermetically closed by a screw-cap. The elements are separated in the cell by strips of blotting paper which retain the exciting fluid composed of a solution of chloride of sodium or chloride of zinc; the elements and insulating pad are held together by a rubber band.

A battery thus charged will yield a continuous current for about eight hours. M. Gaiffe has recently introduced some modified forms of this battery possessing some advantages. Their electro-motive force is about 1·03 volt, and their current is very constant. These batteries are the most portable ever constructed, they will last a long time without recharging, and the recharging may be accomplished with ease when necessary.

Fig. 30.



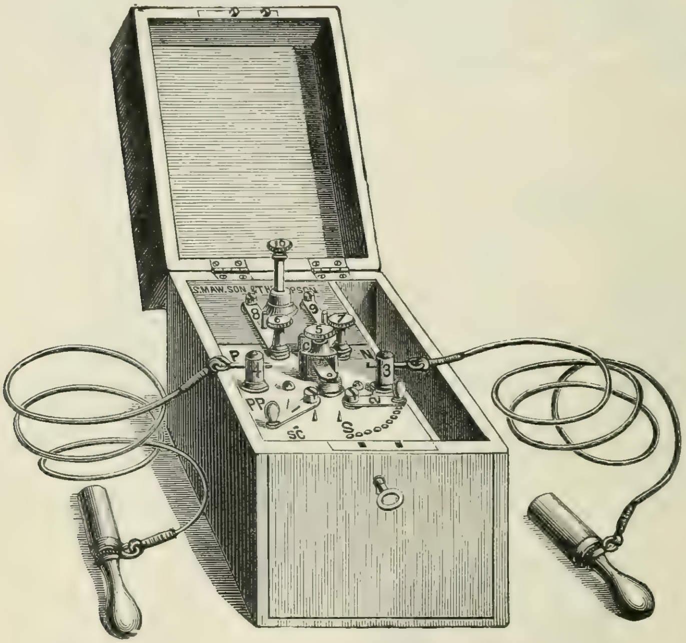
The prime cost of these batteries is rather high owing to the expensive nature of the elements, but the working of them is comparatively low as all the reduced silver is recovered.

These batteries are supplied in several sizes.

Fig. 30 shows a *Gaiffe's* constant current battery of 20 cells.

Fig. 31 represents *Grenet's* induced current battery, the cells of which are charged with bichromate of potash, sulphuric acid, and water.

Fig. 31.



(*To be continued.*)

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## DENTITION AS INDICATIVE OF THE AGE OF THE ANIMALS OF THE FARM.

By Prof. G. T. Brown,
VETERINARY DEPARTMENT OF THE PRIVY COUNCIL.

*From the "Journal of the Royal Agricultural Society of England."*

*(Continued from page* 165.*)*

### Indications of Age of the Horse afforded by the Teeth after the Completion of Permanent Dentition.

From the completion of permanent dentition the evidence of age is to be obtained by the inspection of the tables of the incisor teeth, in regard to their form, the extent and depth of the central cavity, and the shape of the central enamel.

At six years old the horse's age is judged chiefly by the amount of wear which the corner teeth have sustained, although there are other marks which are worthy of notice.

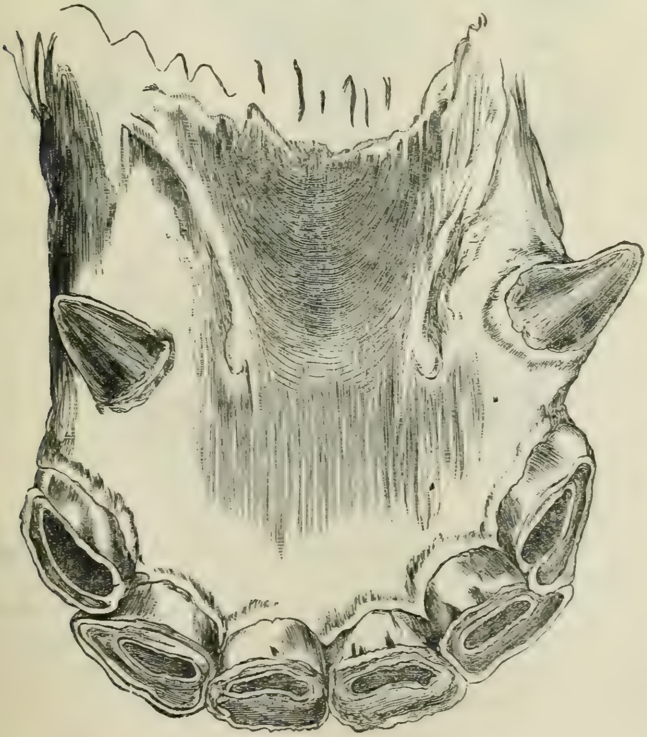
The corner teeth have lost their shell-like character, and a line of worn surface surrounds the central cavity, excepting a small point where the corners touch the lateral incisors. The line of wear is broader at the anterior than at the posterior edge, and the cavity is still of considerable depth.

In the lateral incisors the cavity (or mark) is shallow, and much smaller than that of the corner incisors. The figure described by the central enamel is approaching an oval. The cavity in the central incisor is almost worn out, but its boundaries are distinctly marked by the central enamel which surrounds it, forming an elliptical figure which extends almost across the tooth in the direction of its long diameter, and is nearer to the posterior than to the anterior edge.

The tusks are usually well developed, but their points are not worn, and the hollows on their inner surfaces are well defined.

All the above characters are shown in the illustration (Fig. 15) of the lower incisors of a six-year-old horse.

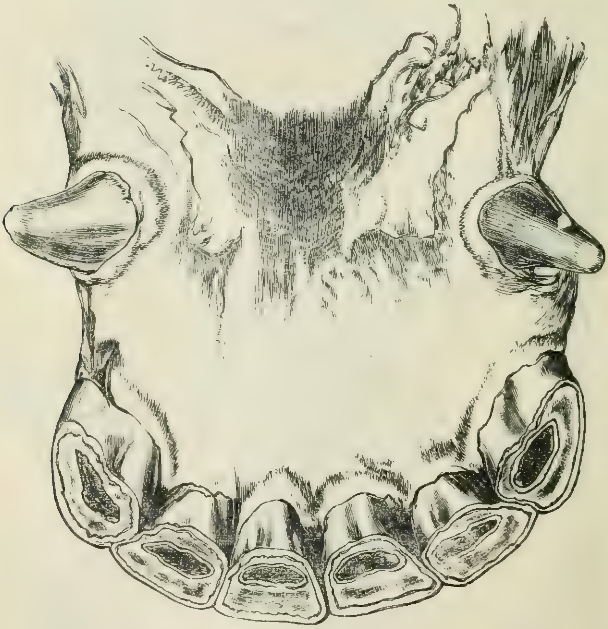
Fig. 15.—*Incisors of Horse at six years.*



At seven years old the tables of the corner teeth are perfectly formed, and the cavity in each tooth is very shallow. The central enamel, however, is well defined, and forms an elliptical figure, which is nearer to the posterior than to the anterior edge of the tooth. In the lateral incisors the central enamel forms a figure which is nearer to the oval than to the elliptical, and the mark, which is very shallow, does not extend so far across the table of the tooth as it does at six years old. These teeth are also deeper from front to back than they were at six years.

The central incisors at seven years old have their sides elongated, so that the table approaches the figure of a triangle. The mark is very close to the posterior edge of the tooth, and the central enamel forms an oval with flattened sides in place of the elliptical figure, which is shown in the drawing of the six-year-old mouth. The tusks are somewhat blunted at their points.

Fig. 16.—*Incisors of Horse at seven years.*

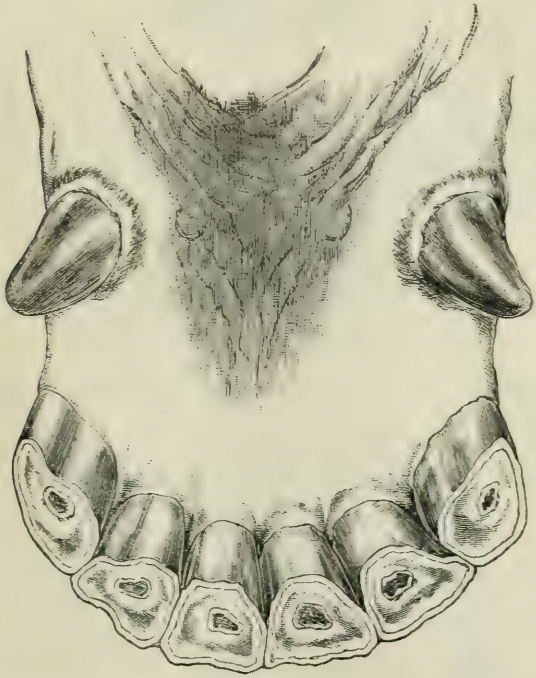


The illustration (Fig. 16) represents the above described characters of the seven-year-old mouth.

In the eight-year-old mouth the form of the tables of the incisors and the shape of the central enamel in the central incisors afford tolerably satisfactory indications of the age. The central teeth are more distinctly triangular than they were at seven years; the central enamel in these teeth is also triangular in figure. All the tables of the incisors are worn as level as the different degrees of density of the various structures will permit. The cavities are either very shallow or quite obliterated by being filled up with one of the tooth tissues, although the central enamel in each other is perfectly well-defined. The gum of the corner incisors at eight years has lost its circular form and become square. The tusks are more blunted at the tops than in the seven-year-old mouth.

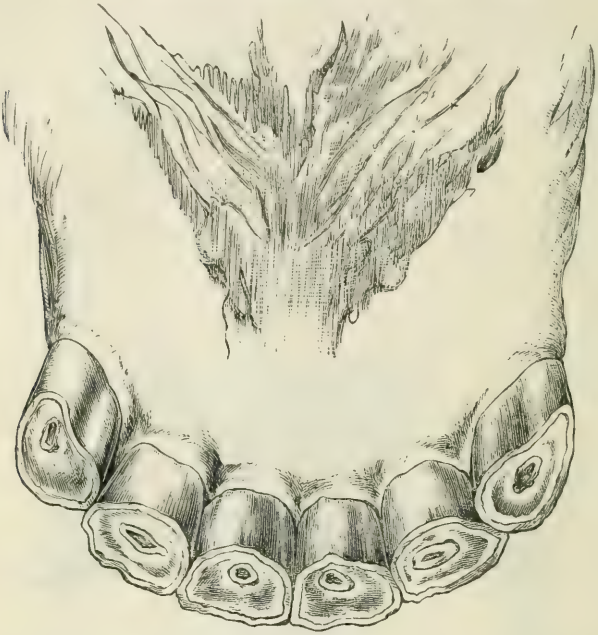
In the next illustration (Fig. 17) the appearance of the eight-year-old mouth is shown. The drawing was copied from the mouth of "Peep-o'-Day Boy" in 1852. The horse was foaled in 1844.

Fig. 17.—*Incisors of Horse (" Peep-o'-Day Boy "), at eight years.*



From eight to ten years old the changes occasioned by the wear to which the teeth have been subjected are not sufficiently regular to enable the examiner to speak positively as to the exact age, but during this period the cavity in each lower central incisor is worn out, and only a small circle of enamel in the tables of the central incisors remains to indicate its position. In the corner teeth at ten years old the central enamel has become round, or nearly so, as shown in the accompanying, drawing (Fig. 18) of the mouth of "Solace," a steeplechase mare, foaled in 1842. The teeth are depicted exactly as they appeared in the summer of 1852, and fairly represent the characters of the ten-year-old-mouth.

Fig. 18.—*Incisors of Horse* ("*Solace*"), *at ten years.*



At twelve years old the teeth are longer from the receding of the gums, and are also narrower in consequence of having been worn towards the fang, which decreases in width from the neck of the tooth to its termination. The tusks are blunted, especially those of the upper jaw, and a quantity of tartar often surrounds those in the lower jaw. The incisors at this age project almost in a straight line from the jaws, and in some mouths a line drawn transversely across the tables of the teeth will cut the centres of all of them, excepting those of the corner teeth.

The next drawing (Fig. 19) represents the teeth of the thoroughbred horse "Lothario," foaled in 1840, as they appeared in 1852.

On comparing the tables of the teeth with those of the mare "Solace" (Fig. 18) at the age of ten years, it will be seen that there are certain important differences. The central incisors have quite lost the "mark," which is only represented by a dot. The central enamel in the remaining incisors forms a much smaller figure than in the ten-year-old teeth. The corner teeth have become more oval in form, and only a trace of the central enamel can be seen.

After twelve or fourteen years of age the evidence which is afforded

Fig. 19.—*Incisors of Horse ("Lothario"), at twelve.*

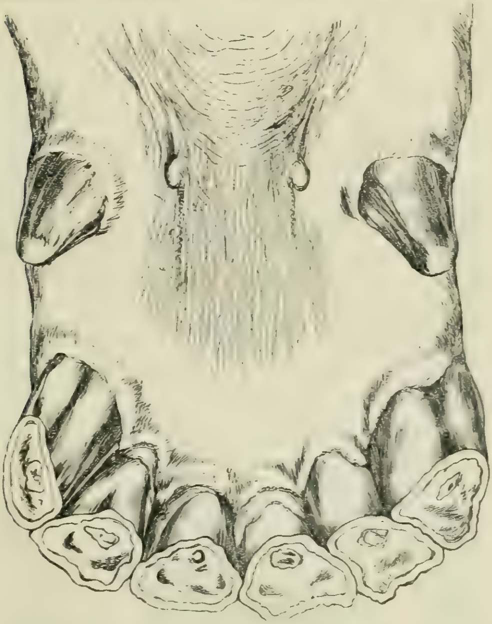
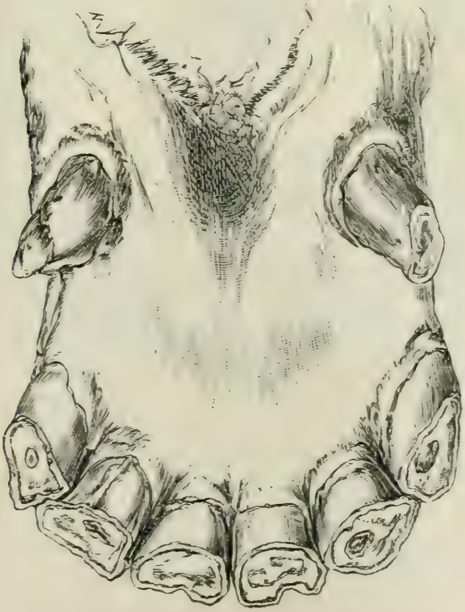


Fig. 20.—*Incisors of Horse ("Kremlin"), at nineteen*

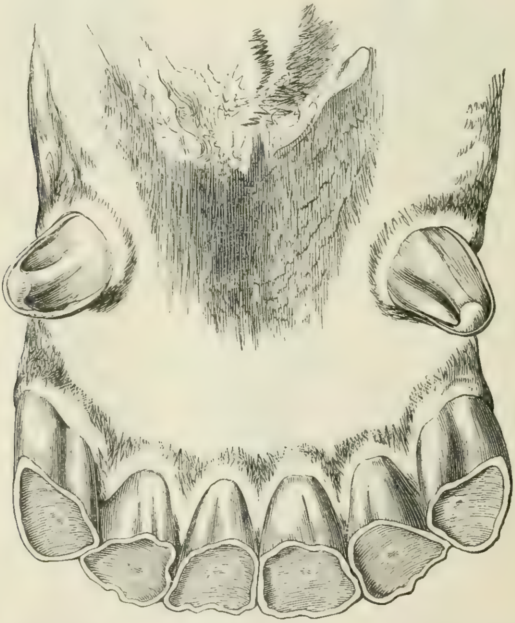


by the teeth is not definite enough to justify a positive opinion as to the animal's age, and the two illustrations (Figs. 20, 21), which are accurate representations of the teeth of the thoroughbreds "Kremlin" and "Epirus," will show how far the appearances may differ in animals of the same age. Both horses were foaled in 1834, and the drawings show the state of the teeth in 1853, when the animals were nineteen years old.

In both cases the teeth form a more acute angle with the jaw than is usual at this age. In this particular both mouths agree, but in other respects they differ from each other to a remarkable extent.

The central enamel can yet be seen in all the incisors of "Epirus" (Fig. 21). In fact, the remains of the marks are more evident than they are in the teeth of "Lothario" (Fig. 19) at twelve years of age. The table of the incisors in the mouth of the older animal are triangular instead of square.

Fig. 21.—*Incisors of Horse ("Epirus"), at nineteen.*



"Kremlin" (Fig. 20) shows a comparatively youthful form of the tables of the incisors, a condition which is due to the rectangular position of the teeth in regard to the jaw, but it is evident that the central enamel is entirely worn out, not a trace remaining. The small circles in the tables of the teeth merely indicate the apex of the inverted cone in which the infundibulum originally existed, and any good observer looking at the two mouths would decide that "Kremlin" was older than "Epirus." It is, however, quite certain that both horses were of the same age, and both of them much older than the teeth indicated them to be.

(*To be continued.*)

## REPLANTATION AND TRANSPLANTATION OF TEETH.

By R. Theodore Stack, M.D.Dubl., F.R.C.S.;

Doctor in Dental Medicine, Harvard University; Dental Surgeon to the Adelaide Hospital; and Surgeon to the Dental Hospital of Ireland.

*Reprinted from the Transactions of the Academy of Medicine in Ireland.*

The fact that I am reading before you to-night a paper on the Replantation of Teeth will not, I hope, cause my audience to assume that I consider this method of treatment one that will in the future supplant to any great extent the operations of filling, syringing, &c. Certain cases will, however, present themselves where this method will prove a valuable therapeutic resource, and it is possible that when the pathology of reunion in these cases is better understood, and the causes of failure and success shall have been more fully investigated, the remedial sphere of the operation may be considerably enlarged. Further, each case of Replantation will have an indirect bearing on the allied operation of Transplantation. Points, to my mind debatable, may thus be cleared up—such queries answered as, *e.g.*, "Shall we fill the root of the scion tooth in all cases? if the pipe is large? if small?" "Shall we, if we have the option, select a scion tooth with a large or a small apical foramen?" "Shall our treatment of the root of the scion tooth differ when we are transplanting into a socket fairly healthy from that to be adopted in case the socket is the seat of alveolar abscess?" These and many other kindred considerations have their best hope of solution from extended and accurately recorded observations. In this investigation we may hope for great aid from the microscope. Such assistance has been willingly and ably given by Mr. Abraham, and I dare hope that through his assistance, seconded by that of my colleagues at the Dental Hospital, Mr. A. W. Baker and Mr. Daniel Corbett, Junr., this paper will be found to contain valuable original matter. To Mr. Abraham, and to Dr. Hayes, who has made microphotographs of Mr. Abraham's sections, I beg to tender a deep sense of obligation.

The subject of my paper—viz., "The Replantation and Transplantation of Teeth," has in the hands of others been usually prefaced by some allusion to the authors of a remote period. This course I shall not adopt, but shall content myself with selecting as the first in time and not the least in practical value of my authorities, John Hunter. Hunter's experiments of transplanting human teeth into the comb of a cock are perhaps familiar to the most of my audience; but as I shall have occasion to refer more than once hereafter to some details of his researches, the importance of which may not have hitherto struck the general reader, I shall here introduce a brief account of this subject. Hunter (Part II. "Nat. Hist. of Human Teeth," p. 111, published 1778, that is, five years before his death) writes that he transplanted a human tooth into the comb of a cock. The bird was killed some months after, and the head having been injected with a very fine injection, and placed in a weak acid, it was found that the injection had penetrated the vessels of the tooth pulp, and also that the external surface of the tooth adhered everywhere to the comb by vessels. In a note Hunter ingenuously adds that this experiment is not generally attended with success, for that out of a number of trials he only succeeded once.

The tooth operated on is not mentioned in his written works, but in the works of his museum, which equally immortalise Hunter's name, the preparation can be seen to this day. An examination of the specimen shows that the tooth was an immature canine. The foramen at the apex is much larger than that in a fully-developed tooth, and much greater therefore than the area of pulp surface, which at this foramen could have come in immediate contact with the tissue of the comb. Hunter thus established that the scion tooth can, under favourable conditions, obtain vital union through the periodontal membrane with the adjacent tissues, and also that the pulp chamber can retain or regain vital contents organically united through the apical foramen with the tooth's new surroundings. The series of experiments, however, which established this possibility demonstrated the high improbability of such a result when the tooth was transplanted into the vascular comb, and it has remained for later observers to determine whether any greater success in the matter of vital union is likely to attend the tooth introduced into a new human alveolus.

The operation of Replantation may be undertaken for four, among other, causes:—1. Teeth removed by mechanical violence. 2. Certain obscure cases of neuralgia. 3. Some cases of exposed pulp. 4. Some cases of alveolar abscess, complicated and uncomplicated.

In cases of the first class a large percentage of success will attend the immediate return of the tooth to the socket, even after the tooth has been out for some hours, or perhaps longer. If after the accident has happened, even one hour has elapsed, I would recommend, as a safeguard against future alveolar abscess, that the root canal be filled antiseptically—*vide* Case IX., where this precaution was not taken.

To the second class belong such cases as that one of exostosis, accompanied by unbearable neuralgia, mentioned in Mr. Salter's work, where one tooth after another had to be removed; on the root of each was invariably found a new growth. Whether the resection of this and replantation would have led to any better result is a matter of conjecture, and possibly will be tried hereafter. I have no experience of this line of treatment in these cases.

For cases of the third class—that is, for exposure of the pulp of the tooth—this line of treatment may be adopted in certain cases where, from the position of the cavity, the access to the pulp chamber and root canals is rendered very difficult. Moreover, in cases where the patient prefers the immediate operation to the often protracted treatment by the application of caustics—also in certain cases, chiefly presenting themselves at Hospital, where the Surgeon feels that if he applies arsensic to the exposed pulp, and that the patient, having experienced considerable pain for the first twenty-four hours, will not return after the cessation of the pain, but will defer his visit for some months, when alveolar abscess has supervened—in these cases the so-called heroic treatment will prove of ultimate advantage to the patient. Cases of these third class have a healthy, or but slightly diseased, periodontal membrane, and in them the operation of replantation, unless there is some unusual difficulty in the act of replacement, as in troublesome molar teeth, will be attended with success.

As regards the fourth class, putting aside exceptional cases, to which the pathological observations I am about to make do not, perhaps, apply, it will be found that nearly all cases of alveolar abscess are accompanied by a dead pulp. The usual sequence of events in the history of a tooth up to the formation of alveolar abscess, is briefly this:—Caries of the crown, which penetrates to the pulp cavity, or very near it. The pulp thus nearly or quite exposed inflames, aches, and frequently suppurates. Lymph exuding from all parts of the pulp strangulates by pressure the isthmus at the apical foramen, and the body of the pulp, having its line of communication closed, and the vessels supplying it strangulated, dies, and rapidly becomes gangrenous. Gases of putrefaction escape through the apical foramen, and goad the periodontal membrane there, which, already prone from its sympathy with its bud (for remember the pulp of the tooth is an offshoot of the periodontal membrane), rapidly yields to the inflammatory process under the putrefactive irritation. The stage of alveolar abscess is now entered. Teeth, extracted at this incipient stage of alveolar abscess, will frequently present at the apex of the root the appearance of a slight aneurism or hernia of the periodontal membrane, a hollow sphere balanced on the top of the head of Atlas, except that the fontanelle in the head of Atlas is open, and that at the bottom of the sphere, where it rests on the fontanelle, there is also an opening. Thus there is a free communication between the cavity of the abscess and the canal in the root of the tooth. The root canal for a time drains the abscess, and prevents an accumulation of the matter secreted from its internal surface; but presently some particle of food may occlude this pipe, and no channel of drainage existing, pus accumulates within the abscess sac, and threatens to dissect the periodontal membrane from the tooth. The pressure of the matter, under these circumstances, if the drainage pipe is tightly occluded, may be so great as to dissect the periodontal membrane from a very large part of the tooth, if not from its entire surface. More frequently, however, the process is more gradual. A small part of the apex is denuded of membrane, when the obstruction in the drainage pipe gives way, and the matter is evacuated through the mouth; or the wall of the abscess may yield, and the matter escape through gums, palate, externally, somewhere on the face, or, as in rare-recorded cases, beneath the clavicle, or into the cavity of the cranium. Apart from these complications, however, as far as the tooth with its bulged periodontal membrane is concerned, we may picture various stages of alveolar abscess.—1. The sphere resting on the top of Atlas' head. 2. The head of Atlas has penetrated the sphere which rests on his shoulders. Next, the sphere has sunk below the shoulders; and so on. In all these later stages it need not be explained that drainage by the root canal cannot be as perfectly performed as in the incipient stage. In the early stage the cavity of the abscess and pipe of the root may be compared to the ordinary bulb syringe, meant to clear itself of fluid. But the cavity of the abscess, with the apex of the tooth penetrating it, may be compared to one of those ink-bottles which can, unless very full, be turned upside down without spilling the ink. Perhaps I shall be considered to have dwelt at too great length on this part of my subject, and that I need not have referred to such elementary matters, but most of those who have written on this question have either neglected, ignored, or disputed some or all of these axioms. To recapitulate the stages of tooth disease up to formation of alveolar absces:—Caries of crown shallow, then deep, penetrating; inflamed pulp, dead pulp, rotten pulp, alveolar abscess, bulb-syringe stage, ink-bottle stage. Apart from disease, death of the pulp may result from a violent blow or fall, or from the application of extremes of heat and cold to the tooth. In my own practice I have never met with a case from the heat extreme, but I have met cases where a piece of ice had produced death of the pulp. These traumatic causes act chiefly on the front teeth. Death of the pulp in these cases is not always followed by putrefaction, but when it does occur alveolar abscess is nearly certain to supervene. As I premised, alveolar abscess in the vast majority of cases is caused by putrefaction of the tooth pulp, whether this latter be the result of disease or accident.

For a moment let me contrast alveolar abscess with abscesses occurring in other parts. The Surgeon may be led away by the plausible analogy between an abscess connected with dead bone and an abscess connected with a diseased tooth. I avoid calling that tooth dead which is connected with alveolar abscess, although it is devoid of sensation, and has its pulp chamber or its branches filled with putrid material. Later on in this paper I intend to define more exactly the application of the adjective " dead " to teeth. But, as I say, one may be misled by the analogy between an abscess connected with dead bone and one connected with a diseased tooth. True it is that after the removal of the sequestrum in the one case and the tooth in the other the abscess in either case will require little further treatment. But it is equally true that in the case of necrosed bone the abscess will never be cured till the sequestrum is removed, while in the case of alveolar abscess the abscess can frequently be cured and the tooth retained. But this cure will not take place unless there is removed from the tooth all putrescent matter. It is most probable that in all cases of the earlier stage of alveolar abscess a cure could be effected by the use of proper antiseptics in filling the pipes of the roots, assisted by an opening through the alveolar wall into the abscess. Under this treatment, after one thorough drainage through the artificial opening, the abscess will usually disappear entirely, and the tooth, with its non-irritant contents, remain useful, comfortable, and nearly as good as new. But in more advanced stages of the affection, though this treatment will often succeed, still it will often fail. In these later stages we have to deal not with the focus of putridity alone, but with the tip of the root of the tooth stripped of its periodontal membrane as a superadded difficulty. It may be assumed that from the meshes of this tip the products of putrefaction cannot be expelled, nor can they be neutralised by antiseptics, however potent, inserted into the root.

It is time that I should now discuss briefly Professor Magitôt's communication to the Dental Section of the International Medical Congress in 1881. There Professor Magitôt brought forward a list of 100 cases of replantation. This operation was undertaken in nearly all his cases for the cure of alveolar abscess, simple or complicated. A curious feature of his list is the high average of cases of alveolar abscess without caries contained in its columns. Thus out of his 100 cases 29 were the subjects of alveolar abscess without caries. Nor is there any mention made of these teeth having sustained any injury, except in Case LIX., where the cause is described, "*chute de cheval pendant la guerre.*" Is there, then, some new Dental Disease in Paris with which we in Ireland are unacquainted? The solution of this difficulty will, I believe, be found by a careful analysis of the Professor's table. Of these 29 cases 27 are front teeth. Now front teeth are all liable to accidental violence. Sometimes also these teeth are ground down till a minute opening is made into the pulp chamber. To one or other of these causes it is probable all these 27 cases of abscess are to be referred. But it may be asked—Though you may in the case of accidental violence find death of the pulp, how is decomposition of the pulp to be accounted for? Is not the pulp, sealed up in the tooth, secure from septic influences? Mr. Charles Tomes draws attention to this phenomenon. He has found bacteria in pulps in non-carious teeth, the vitality of which had been destroyed by accident. He has established the fact by microscopic observation, but does not as yet offer a solution of it.

Professor Magitôt claims a high percentage of cure; thus, out of his 100 cases he claims a success of 92. His method of operating is to extract the tooth, cut off from 1 to 5 millimetres of the end of the root, and replant the tooth; also to establish an open fistula through the alveolus. No antiseptic precautions are adopted, the tooth being merely washed in water.

Notwithstanding the high percentage of cure I think it is possible that a greater percentage could have been attained if Professor Magitôt had adopted the principle of filling the roots antiseptically; moreover, I think in many of his cases the cure will ultimately prove to be incomplete. By his treatment he has reduced all his cases of alveolar abscess from the safety ink-bottle stage to the bulb-syringe stage; and this will insure their remaining quiescent for a considerable time. But the teeth treated by his method must all contain the noxious leaven which will be a constant source of peril to their health. A reference to case IX., to which I have already alluded, contributed by Mr. Arthur Baker to our joint list, proves that a tooth with a dead pulp may be replanted and remain apparently sound for four years, when the septic influence at length prevails and alveolar abscess and its consequences supervene.

Mr. Finlay Thompson recommends extraction of the tooth, resection of diseased part, and then the insertion of a gold tube in the root, with a cap of gold over the cut extremity of the fang. This treatment appears equally elaborate and useless. It aims at securing drainage through the tooth, and preventing absorption of the root. It would appear that drainage could be as well effected through the natural canal; and how the gold cap is to prevent absorption of the root is a mystery. Further, the length of time the tooth has to be kept out of the mouth must be very great, and the chances of genuine reunion must be lessened by this delay in the operation.

Mr. Coleman, to whom, indeed, in a great measure is due the credit of the revival of this operation, recommends extraction, filling of the roots rapidly, cutting off any diseased part, and reinsertion. The time occupied in his operation does not exceed fifteen or twenty minutes. Unfortunately in his earlier operations he adopted the practice of dipping his tooth in pretty strong carbolic acid; and, further, he does not appear to have given due weight to the necessity of draining through the alveolus.

The method adopted in my own and a large number of Mr. Arthur Baker's cases is as follows:—Extraction of the tooth, which is enveloped in a small piece of rubber-dam moistened with carbolic acid, 1-200; end of root resected or filed off; root canal cleared out by entering drill at apex; a small rope of cotton moistened in creosote or eucalyptus oil, to which has been added some iodoform, introduced into the canal; extremity of canal countersunk and sealed with Sullivan's cement or Jacob's gutta-percha; crown filled with amalgam, or some plastic filling; socket of the tooth washed out with very dilute carbolic acid; free incision into abscess, if any, through alveolus. Time of operation, fifteen to twenty minutes.

I here take the opportunity of dwelling on the value of iodoform as an antiseptic. The observations of my colleagues, Mr. Baker and Mr. Corbett, coincide entirely with my own in this matter. Indeed I think that my attention was first directed to its extreme value by Mr. Arthur Baker. Having often contemplated the operation of replantation, I hesitated to undertake it until I understood the power of this valuable therapeutic agent.

The table of some 30 operations laid before you, compiled by Mr. A. W. W. Baker and myself from private and hospital practice, does not contain any such extreme case as some of the severely complicated records in Professor Magitôt's Register. Only 17 have been replanted for the cure of disease. In these 17 cases the tooth replaced in the socket had, of course, been diseased. In the remaining 13 the tooth introduced into the socket was sound. We consider that many of these operations are too recent to form a sure foundation for accurate statistics. As yet, however, there has been no case of failure. In the greater number of these cases the method of operating was that advocated in the list, but in several a different method was adopted, with, as far as our list goes, equal success. In the table appended will be found a *précis* of these observations.

(*To be continued.*)

## UNPARDONABLE FAULTS,

### PRODUCING IN OUR PATIENTS NEEDLESS DREAD OF DENTAL WORK.

THE following unpardonable faults are enumerated in *Items of Interest*:—*First*. A coarse, uncouth, unceremonious appearance and behaviour are unpardonable. Some can overcome all this by severe culture. If it is not possible there should be a change of employment.—*Second*. An unapproachable, stiff, forbidding air is repellent. A sensible patient soon discovers the difference between a dignified reserve with a manly bearing and a cold, hard rigidity of assumed independence.—*Third*. A stern, haughty, self-conscious superiority is disgusting. Real greatness is modest. While our manner may show self-confidence in our ability, there should be that conciliatory spirit and severity of manner which puts our patients at ease with us.—*Fourth*. A rough, careless manner in our movements, especially in our treatment of the mouth and teeth, causes needless aversion to dental work. Some Dentists seem to think it smart—an evidence of professional experience and skill—to act in a blunt, nonchalant way. They seize the mouth with rudeness, and draw back the cheeks so roughly as not only to anger their patients, but sometimes to actually do harm. So in their unmannerly attacks upon the teeth they affect indifference to pain, laugh at complaints and work like butchers, assuming that severity will be taken for thoroughness.—*Fifth*. A too familiar, maudling, patronising air is equally repellent. Soft, silly, foolish expressions and demeanour are disgusting.—*Sixth*. Dull or improper instruments are cause for complaint. The idea of some that it will be taken as evidence of skill to have but few instruments, and the boast that "I can use anything" is nonsense; the more skilful the Dentist, the keener, brighter and more delicate, varied, and appropriate will be his instruments.—*Seventh*. Disregard of the comfort of the patient is a needless fault. We place the patient in almost any position of awkwardness and discomfort for our own ease, without seeming to think the patient has any rights that we are bound to respect, and sometimes when our own comfort does not make it necessary, the inconvenience is the result of mere thoughtlessness.—*Eighth*. Not using available means for lessening hypersensitiveness of teeth gives unnecessary dread of any future dental work. We cannot here speak in detail of what these are. Every Dentist who truly sympathises with his patient will find himself more and more successful in finding and using them.—*Ninth*. Close attention to the work in hand will be gratefully received. Inattention, listlessness and laziness will be considered an unpardonable slight. Incessant talking is irritating, and especially conversation with others in the room. Stopping work to receive others, or giving them examination or advice is a cause for complaint; for a patient naturally feels that he is paying for the time he occupies the chair, and has a right to the Dentist's close attention. The habit also of doing slowly what may be done rapidly, or spending much time in insignificant details or preparations which should have been completed before the main work was commenced, mortifies and gives a sense of injustice.—*Tenth.* Equally faulty are those discomforts necessitated by the neglect of proper office appointments, and the want of cleanliness of our person, habits or surroundings.

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## ON THE INFLUENCE OF MICRO-ORGANISMS IN THE PRODUCTION OF CARIES.

*(A Paper read before the Odontological Society.)*

By Arthur S. Underwood, M.R.C.S., L.D.S.Eng.

(Lecturer on Dental Anatomy and Physiology at the Dental Hospital of London Medical School, &c.)

(*From the "Transactions.*")

Mr. President and Gentlemen,—Mr. Milles and myself have so much to lay before you to-night in the form of evidence concerning the part played by Micro-Organisms in the Production of Caries, that we feel confident you will excuse us if we go straight to the matter in hand without an unnecessary waste of time in the form of preamble.

It is, however, necessary to state that we only propose to discuss the purely pathological side of the question to-night, and that only so far as the dentine alone is affected.

As we stated in 1881, we still consider that the initial stage, that is, the enamel destruction, is probably little more than a chemical solution of the tissue by an acid or acids; but we are inclined to believe that the greater part of such acids are the result of fermentation, a process which is entirely dependent upon micro-organic life, as has been amply proved by Pasteur, Lister, and others.

As the result of the decomposition of albumenoids, numerous substances are formed in the mouth—peptones and other similar bodies, fatty acids, acetic, formic, butyric, malic, lactic acid, etc., and in some cases sulphuretted hydrogen and ammonia, are produced in large quantities. This decomposition is directly produced by the vegetation of micro-organisms.

A very simple illustration of this fact is obtained by filling two bottles with neutral saliva and bread, and rendering one aseptic, either by adding carbolic acid or boiling, or any other process of the kind. The micro-organic growth which will take place in the impure one will produce a large quantity of acid; the pure one will remain neutral.

The most constant source of an acid reaction in the mouth is undoubtedly micro-organic fermentation.

This is not, however, the main subject of to-day's Paper, and therefore we shall content ourselves with this passing allusion to it.

We cannot, however, refrain from expressing our gratification at the careful attention this subject has received from the Profession, both here, in America, and on the Continent. Professor Mayr has worked out the chemical aspect of the question with great care and exactness ; Mr. Tomes has done much in the direction of the effects of organisms in the soft tissues of the teeth ; Mr. Spence Bate has given us many valuable suggestions in his able and exhaustive summary of Dental Science at Plymouth last year ; Mr. Sewill has thrown out valuable conjectures upon the remote etiology of caries ; and Dr. Miller, of Berlin, has done an immense amount of microscopical work, contributing a large array of evidence.

We have not been able until now to present our own views in full because many of our experiments required a long time to verify and confirm ; some afforded perplexing and almost contradictory results, requiring a long time to clear up, and involving much repetition ; and we may add, in explanation of the apparent delay, that what takes but little time to write or say often requires months, and even years, of disappointment and patience to work out.

In the autumn of 1881 we were only justified in speaking with any amount of positiveness upon one point, namely, the actual presence of micro-organisms in carious dentine. This one fact, and the evidence in support of it, formed the body of the Paper we ventured to present to the International Congress. Micro-organisms were found in every fragment of carious dentine of which we cut sections, and we had cut immense numbers ; the leptothrix of MM. Leber and Rottenstein was, we found, a superficial growth.

Another fact of scarcely less importance, but one supported by far less evidence, was that the agencies to whose action caries had up till then been attributed by a large majority of scientific opinions, namely, certain acids, were unable to produce any such changes upon teeth exposed to their action alone, although the enamel protection was removed, and the acids employed were those present in the mouth. We had read many allusions to caries produced in teeth out of the mouth by artificial means ; we employed the means indicated (whenever they were indicated, which was rarely), with the addition that we did so under absolutely aseptic conditions ; we repeated the experiments, and the result of (in some cases) years of exposure was that no change that we could detect took place. Here was a second, but a negative fact.

The third fact obviously required was a positive one : it remained to inoculate dental micro-organisms into the flasks and observe the result. We did so, and the result was change in the exposed dentine, but so slight that we could not succeed in cutting a section; still, at the time of our Paper of 1881, we firmly believed that this change, when allowed to become more intense, would prove to be caries. Of this fact we felt bound, however, to speak very cautiously, and for the last two-and-a-half years we have employed every means in our power to clear it up—with what result we shall endeavour to make plain to you to-night.

We are anxious that you should keep clearly before you four main issues, upon which all the theory which we suggested to you in 1881 depends.

1. That certain forms of micro-organisms, namely, micrococci, rod-shaped and oval bacteria, and short bacilli are invariably present in carious dentine.

2. That these micro-organisms extend into the tissue as far as does the caries.

3. That no agents can be made to produce a change resembling caries in the absence of such micro-organisms, *i.e.*, under aseptic conditions.

4. That under septic conditions a change can be induced which, although we are not prepared to call caries, does in some particulars resemble it; teeth in which this change has been produced we shall submit to you to-night, and also suggest to you why we hesitate to call it caries.

These four points once established upon reasonable evidence, we shall ask you to consider whether we are not justified in deducing from them the conclusion that micro-organisms play an important part in the production of the disease as we see it and are called upon to treat it, and that their active presence is an absolute essential to its production.

We may add incidentally that we never suggested that no other agency assisted in the process, although a recent writer attributes some such absurdity to the advocates of the germ theory. We do not consider ourselves justified in wasting your time over such a digression. The first point to discuss, then, is the constant presence of micro-organisms in carious dentine. Upon this point the evidence submitted to the Profession by us in 1881 was very strong. We were then able to state that, since we had succeeded in properly cutting and staining sections, we had always discovered micro-organisms. The appearance was not caused by softening agents, because the teeth were cut fresh and immediately after extraction. The number of sections cut by us between 1879 and 1881 was so great that we were convinced that the phenomenon was constant.

Since then, Mr. Charles Tomes has, we believe, made some investigations which have led him to concur in this constant presence.

Dr. Miller, of Berlin, has cut a very large number of sections of carious dentine, with a result which is completely confirmatory of our assertion that micro-organisms are invariably present. In fact, this point has been confirmed by every careful observer, and may be considered to be completely established.

The second point is one very much more difficult to decide—the more so because statements have been made upon this point which tend very much to confuse the mind of the reader. It has been stated by Dr. Miller, who has written a very large number of Papers upon this and kindred subjects during the last two years, that there is a zone of softened dentine of considerable width, not infected with micro-organisms, separating the normal dentine from that which is so infected; and further, that the outline of this area of softened dentine does not correspond with the outline of the area infected with organisms. We have attempted to verify this observation, but we have arrived at the conclusion that if there be any such zone at all we cannot believe it to be of any considerable depth, as we have not succeeded in finding any softened tissue that did not contain micro-organisms. Having regard, however, to Dr. Miller's reputation as a careful and conscientious explorer, we do not desire to attach too much weight to negative evidence; later on we shall suggest some weighty positive evidence on this point. With regard to the outline, we have invariably found the outline of the changed tissue to correspond with that occupied by micro-organisms, and we feel less hesitation in doubting this latter statement of Dr. Miller because he claims to be able to compare these outlines with the naked eye, unaided by any instrument; we think that this is too rough a test for objects whose greatest measurement does not exceed the $\frac{1}{10000}$ of an inch.

There is no doubt that it is easy to establish a line of demarcation with the aid of a sharp instrument between tissue that you can easily prick and that which is quite hard: this line no doubt corresponds very nearly to the edge of the disease; we have also come to the conclusion that it corresponds very nearly to the edge of the micro-organic invasion, that is, we have cut sections as near as we could to the healthy tissue, and have found them infected. We do do not, however, attach so much weight to this fact as to the following experiment, which we think must be allowed to be absolutely conclusive.

Before we can explain its full weight we must enter into a few details of the method we employ to grow and cultivate special germs. We used to make a meat infusion, boil it, introduce it with antiseptic precautions into aseptic test tubes, and seal the tube with wool. If the fluid remained clear we knew it was pure; if it became turbid within a day or two we knew our precautions had not been complete, and some germs had been introduced accidently, and the tube was of course useless. If we wished to grow a special germ we rubbed a purified probe against the infected spot, and introduced it into the fluid, replaced the wool cap, and the ensuing turbidity denoted the growth of the germ. The objection to this plan was that the turbidity spread through the entire fluid, and if we had, despite our precautions, introduced any other organisms besides those we specially intended to introduce, they all became inextricably mixed in the ensuing putrefaction. To obviate this we adopted Koch's plan of adding gelatine, and instead of a pure fluid, making a pure jelly; when this was inoculated in a particular spot the growth was confined to that spot, and if anything else dropped on the surface of the jelly it grew there quite separate. Under these circumstances we noticed that different forms of germ grew in quite different ways, some, for instance, forming a white ball, others a mass of spiculæ, others wavy lines; these peculiarities of growth could be easily reproduced in other flasks by a second inoculation, until we found it quite easy to separate each variety and grow it by itself without any extraneous growth to confuse the result. We have brought down some flasks with growth going on to show you to-night. Well, we proceeded to inoculate flasks with those deepest portions of softened tissue which formed the most outlying layer of changed dentine, and we found that from these portions a growth of organisms proceeded, proving beyond doubt that organisms were contained in the pieces inoculated. This is not a doubtful experiment; it absolutely demonstrates that the deepest portions of the softened tissue contained organisms, and that if there exist any zone of alteration beyond them it is so microscopically narrow that we have not been able to detach a fragment of it.

We do not, however, deny that there is a great probability that the advance guard of micro-organisms may be surrounded, and, *to a microscopical extent only*, preceded by a softening, the result of the action of those acids which they themselves produce,—we shall be able to show that they do generate acids capable of softening dentine, and therefore we should expect to find this effect slightly in advance of their presence,—but this is hypothesis merely. We would further add that the transition from very carious tissue to that which seems quite healthy to the eye and the touch is, in the greater number of cases, more sudden than is generally supposed, and allows but little space for this non-infected zone; to convince one-self of this it is only necessary to split a number of carious teeth and prick the surfaces. One more fact should be borne in mind in this connection, namely, that healthy dentine softened by a weak acid does not look different under the microscope from healthy dentine cut fresh, and it is therefore impossible to detect the softening microscopically; the tubes are not larger, nor are they irregular, as is the case in carious dentine—in fact, the existence of such a softened and uninfected zone separating the infected from the non-infected dentine is a matter so difficult to demonstrate that we do not think much value is to be attached to it.

We now come to the third point, viz., that it is not possible to produce caries or anything resembling it, by subjecting teeth to the action of acid fluids in flasks out of the mouth, provided the flasks be kept in a strictly aseptic condition. We no not think this point has ever been disputed, and we feel in a position to state that the evidence upon which it rests is incontrovertible; but before discussing it, and the point that follows it, we think it will not be a waste of time to explain what we mean by a change resembling caries. We mean a change by which the tissue affected is made distinguishable from that which is normal to the naked eye and touch or under the microscope. To the naked eye it must become discoloured,—we only mean changed in colour, and not necessarily brown; the surface loses it polish, or, if moist, the affected part must be separable from the healthy with an instrument; to the touch it must become softer; under the microscope the channels must become dilated at the expense of the matrix. In 1881 we exhibited several flasks in which infusions of meat and saliva containing malic, butyric, and other acids had been allowed to act upon exposed dentine for periods varying from one to three years; the teeth were liable to caries because they had suffered already from it; healthy portions were denuded of enamel and partially protected by wax, a certain part being left exposed, with no perceptible result whatever. Of course a strong acid, or a large amount of acid, would decalcify the tooth, but this does not resemble carious change.

These experiments were sufficiently numerous and conclusive to warrant us in passing on to the fourth point of this investigation, and this will detain us longer than any of the others, as it is in this direction that we have experienced the greatest difficulty and the most perplexing results.

We were so fully alive to the overwhelming difficulties attending any attempt to reproduce out of the mouth the complicated conditions existing therein, that we should have felt anything but sanguine but for a curious accident that encouraged us to to proceed in this direction. We will therefore commence by telling you the particulars of this accident.

At the Congress in August, 1881, we exhibited, among other flasks, a series intended to illustrate the fact that no change resembling caries could be induced upon the surfaces of teeth under aseptic conditions. These flasks all contained an infusion of meat and saliva with malic and butyric acid and teeth susceptible of caries, the surfaces ground down to expose the dentine, part of the exposed surface being protected with wax, so that any loss of substance could be at once detected in the exposed part. Now these flasks, which were labelled i, iii, iv, v, vi, had remained perfectly pure from the time they were put up, June, 1880, till the Congress, August, 1881, that is, fourteen months, and no visible change had taken place in the exposed surfaces. In taking them home in a bag, flasks i, iv, and v fell down, allowing the fluid to come in contact with the cap covering the flasks; iii and vi remained upright.

In the course of a few days, flasks i, iv, and v, which had tumbled down, became turbid; iii and vi remained, of course, pure. By the 5th of December, 1881, iii and vi were to all appearances, as before, unaltered; but the teeth in i, iv, and v were already discoloured brown; moreover, the discoloured parts were on the surfaces slightly softened, and although the change was so shallow that we could not obtain a good thin section of it, we could see that the tubes were enlarged and contained a material that stained readily, which, owing to the thickness of the section, we could not, unfortunately, identify. Now, whatever this change was, it was manifestly dependent upon the introduction of organisms; nothing else was introduced. Fourteen months' immersion in the fluid when aseptic failed to change the teeth at all; four months in the same fluid plus germs produced a change; the same additional four months in the sister flasks produced no change at all;—this seemed an important addition to the facts in our possession at the Congress. The next stage was less satisfactory: the change did not seem to progress; do what we would, we could not produce a considerable change. We conceived that this might arise from the fact that several important conditions favourable to the activity of the germs in the mouth were absent in the flask. First, the temperature of the body; second, opportunities for lodgment; third, constant renewal; fourth, unlimited and varied pabulum; we therefore contrived a very elaborate experiment in which we proposed to assemble all these conditions, and as many more as we could think of. We erected a large incubator, which we kept continually at the temperature of the human mouth; it was divided into an upper and a lower story, which communicated by an aperture. In the upper story was a small bath with a tiny tap contrived to drip drop by drop through the aperture into a second bath in the chamber below; this again dripped into a receiver, the fluid being thus kept in constant circulation through the middle bath. In this middle bath were placed some teeth set side by side as in nature, the roots being implanted in a block of hippopotamus ivory, and weak points created in the interstitial parts with the burring engine, the size of the burr being kept to test any enlargement of the holes, and some others implanted in wax.

The upper bath was then filled with saliva, milk, bread, decaying teeth, meat, etc.; while some fragments of the latter were inserted about the teeth in the middle bath. The lowest receptacle was periodically emptied, while the top one was periodically fed. Without troubling you with more details, we thus contrived to assemble the proper temperature, the pabulum movement, and the normal disposition of the teeth. Now six months of this highly unsavoury experiment produced scarcely any perceptible change, except that all the tissues became black, the holes drilled in the blocks and in the teeth were the same size, and their edges were not a bit softened. The putridity of the baths was, however, so offensive, that it was with some relief that we decided to abandon this particular experiment. We saw that some great essential condition was absent, and though a longer period might doubtless have produced slight changes, my health and appetite suffered from the constant exposure to all these putrid smells, and we agreed to stop the incubator; but this experiment, though apparently a failure, led us to what we conceive to be the true solution of the difficulty. So far we had decided only that some essential factor had been omitted.

The next experiment we shall describe is a repetition of one described by Dr. Miller, with this extension, that it has been carried out under septic and aseptic conditions. Two 8-oz. bottles were half filled with saliva; to this was added bread in both cases, and in one carbolic acid; into these were introduced fragments of healthy teeth extracted for regulation and split. The saliva was the same,—*i.e.*, from the same mouth,—and taken at the same time, the bread from the same piece, the teeth were halves of the same tooth; both fluids were neutral. The bottle not containing carbolic speedily became the scene of an active growth of micro-organisms, for the greater part micrococci; a thick felt of this growth formed at the surface of the fluid. At the end of three months the surfaces of the teeth in the impure flask had become softened, but not discoloured: the surface of those in the pure flask was unaltered, the fluid in the pure flask was neutral, that in the impure one strongly acid. Thus in the impure flask acids were generated as well as germs, or, as we think seems more rationally to express it, by the germs. The teeth from these fluids are here for your inspection. Lastly, a number of teeth are here for your inspection in which a change has certainly taken place after a long immersion in septic fluids.

It is plain, then, that whereas in the absence of germs no change takes place that could be supposed to be caries, and that in the presence of germs a change does take place, which, although it would render our views more cut and dried to call caries, we are bound to confess is a very weak caries if it be caries at all, and further, remembering that unmistakable caries does affect natural teeth on artificial dentures which have no connection with the vascular system, we are led to inquire whether organisms, that are undoubtedly the prime factors in the production of other diseases, afford us any analogy of a loss of power when placed in strange conditions. The answer to this inquiry is very plain and direct, and completely in the affirmative.

Pasteur, Naegali, and other equally reliable authorities, have discovered that special organisms alter their character when grown under unusual conditions. Even though they continue to grow and reproduce their species, their special properties weaken and die out in the unnatural surroundings. Thus, to take a couple of typical instances, Pasteur, by growing bacillus anthracis at a peculiar temperature, "attenuated" the organism to such an extent that he was able to vaccinate animals with it—that is, he rendered this special bacillus, which, in its normal condition, would, if inoculated into an animal, produce anthrax, practically inocuous by changing its surrounding conditions. Again, Naegali has been able so to modify the properties of a lactic acid producing bacterium that it produced an ammoniacal fermentation. Lastly, certain pathogenic bacteria require a special soil in which to grow and a special temperature, otherwise the growth ceases altogether, Moreover, the presence of a number of extraneous organisms does in some cases hinder the active growth of others. A similar difficulty has attended the attempt to grow the organisms of gonorrhœal ophthalmia, and such instances may be almost indefinitely multiplied; the conclusion is, however, pretty plain, namely, that special organisms require special surroundings to display their special activity, and we are inclined to think that in the case of the micro-organism of caries a living mucous membrane is one of those conditions.

In view of these facts we feel ourselves justified in claiming to have established as a permanent addition to dental pathology the fact that micro-organisms of a special form do play an important part,—nay, more, that they are an essential factor in the production of caries. We think many of these experiments show that these organisms do much of the work—at any rate, as far as the removal of the lime salts goes—by the aid of an acid which they produce. We feel convinced that the process, to be effective, must be carried on in a living mouth, probably because that is the only situation in which the special germs are really active. Analogy seems to warrant this deduction; but before concluding we wish to impress upon the meeting, and through the meeting upon all who take an interest in the matter, that all we claim for the germs is, that without them and their products the process could not go on at all. The essential element that was not present in our artificial experiments is present in the mouth; it is possible, and we consider, from the analogies quoted above, *probable*, that this important element is the living buccal mucous membrane as a scene of operations, and the constant succession of the proper germs. Enough has, however, been laid before you to induce us to hope that this Society will endorse the statement made by us in the August of 1881, and repeated more fully now, that micro-organisms play an important part in the production of caries, and that the dental pathology of the future must include them among the most powerful factors in the production of this disease.

## JOURNALISTIC SUMMARY.

### DENTAL COSMOS (*April, PHILADELPHIA*).

"EMBRYOLOGY, with Special Reference to the Development of the Teeth and Contiguous Parts," by J. L. Williams. This section of the article, continued from the previous number, deals with the development of the teeth, and is illustrated with eight drawings. This description of dental development agrees in general with the mode of development now accepted as correct. The inner growth of the epithelial lamina the writer regards as due to the rapid proliferation and increase in the size of the cubodial or polygonal cells within the band, rather than a development of the columnar or prismatic cells. He disputes the existence of a membrana præformativa between the enamel and dentine germs. He believes that the enamel organ is a true secreting organ—its epithelial nature and its general appearance under high powers—the fact that it is surrounded by an intricate plexus of capillary blood vessels—that material for the formation of enamel has no other evident source—and that all epithelial ingrowths from the skin layer are glandular in their nature, led him to this conclusion. The article is to be continued.

Among the INCIDENTS OF OFFICE Practice mentioned at the January Meeting of the New York Odontological Society, Dr. Watkins exhibited a lower molar which he believed had been split open from the pressure of gas in the nerve canal. When he extracted the tooth the mesial half of the anterior root was left remaining in the socket. It was afterwards removed very easily. Dr. C. E. Francis mentioned a case of a second lower molar being split through the centre from the one side to the other. The pulp was alive and apparently healthy. The patient could not imagine how the tooth became fractured. Some floss silk was wound round the tooth and the cusps ground away. A gold shell was made to envelope the entire tooth, and, being lined with oxyphosphate of zinc, was forced into its place. This was about two years ago, and the tooth has not up to the present time caused a moment's discomfort. It is certain that the fracture was not caused by pressure of gas in the pulp chamber. Dr. Bödecker mentioned two instances in which the lingual root was split off from the crown. In one case the tooth contained a living pulp; in the other the pulp cavity had been previously filled. Dr. Woodward stated that there was no doubt in his mind that a tooth can be split by the generation of gas in the pulp chamber. A patient of his, whilst sewing in her room, heard a report in her mouth almost as loud as that of a pistol, or loud enough for her sister to hear, who was in an adjoining room. Upon closing her teeth she "found that a molar had been sprung from its socket." The split was directly between the bifurcation of the two roots.

At the same meeting there was a long discussion upon INSTRUMENTS.

Attention was directed to a new form of gold recently introduced by Mr. R. S. Williams, which he calls "Electric Gold." Dr. Lord said that from the manner in which it is prepared, or the way it is put up for use, it is rendered much more cohesive than any gold he had ever used, and, in addition to its extra cohesive qualities, it works softer, is more pliable, or less stiff and harsh, than other forms of cohesive gold. This gold is put up in folds, and he thinks that this preparation of gold, for all purposes for which cohesive gold is used, is a very great gain over the usual forms and qualities of the cohesive preparations. In all cases this gold must be annealed before it is used. He uses soft or non-cohesive gold for the cavity proper, for lining the walls and filling up to the margins, then forces the cohesive into the soft, securing it mechanically as well as otherwise, which further condenses the soft, and at once gives a cohesive surface to build upon.

Dr. E. J. Payne read a Paper on "Gutta-percha," referring to its preparation and its uses in Dentistry.

The January Meeting of the Odontological Society of Pennsylvania is reported, and includes a Paper on "The Etiology of Caries at the Gum Margins, and the Labial and Buccal Surfaces of the Teeth," by Dr. E. I. Darby.

The Report of the First District Dental Society, State of New York, held in May, 1883, contains a discussion upon Crystal Gold.

## THE AMERICAN JOURNAL OF DENTAL SCIENCE
*(March, BALTIMORE).*

"DENTISTRY AND OTOPATHY," by Dr. F. Park Lewis. A notice of this Paper is found on page 91 of the DENTAL RECORD.

A discussion on the "Etiology of Dental Caries" is reproduced from the *Transactions of the Ohio State Dental Society*.

"TREATMENT OF CHILDREN'S TEETH" was the subject of a Paper read before the New York Odontological Society, by Professor E. I. Darby, and reported in the *Dental Cosmos*. The other articles are, "The Causes of the Failure of Gold as a Filling Material," by Dr. A. A. Blount, from the *Independent Practitioner*, and "Staining Artificial Teeth to Match Exceptionally Natural Ones," by William Dunn from the *British Journal of Dental Science*.

## THE INDEPENDENT PRACTITIONER *(April, NEW YORK).*

The first Article is "An Address to the Graduates of the Philadelphia Dental College" in February last, by Professor S. H. Guilford.

"IODOFORM IN DENTAL SURGERY," by Dr. Bödecker. This article is continued from the previous number. In Dental practice Iodoform is, as yet, not in general use, although those practitioners who have employed it praise it very highly as a remedy in chronic pulpitis, a capping for exposed pulps, in dressings in oral surgery, and in some instances a preventive against acute alveolar abscess. We possess no drug which in its action is as certain as iodoform. Every

Dental Practitioner knows how annoying it is to see patients with an acute alveolar abscess, especially when this occurs in teeth the pulps of which have been dead for some time, and which, previous to the opening of the pulp chamber, have given no trouble. I know of no remedy which will prevent this as surely as the saturated solution of iodoform in ether when used in the proper way. In some instances we can open the pulp chamber of a pulpless tooth, which usually contains a great deal of septic matter, clean it out, fill it at once, and no trouble whatever will arise. My proceeding is as follows:—I drill a hole into the tooth or filling until it very nearly reaches the pulp chamber. I fill this hole with a saturate solution of iodoform in ether (about 1 ʒ to 1 ℥ of sulphuric ether), and very quickly, before the ether has evaporated, pierce the remaining septum of the pulp chamber. Then fill the pulp chamber loosely with a piece of cotton saturated with the iodoform solution and temporarily seal it. This plug I allow to remain from three to five days before I attempt to clean out either the pulp chamber or root canal. At a subsequent visit the rubber-dam is applied and the canals cleaned out and filled. If, however, there are any inaccessible, narrow, or curved canals, I introduce one or two drops of an aqueous solution of chloride of zinc (about 40 grs. to j℥) and temporarily seal the cavity for 24 hours. The temporary filling is then removed, a few drops of absolute alcohol applied, and the cavity moistened with the solution of iodoform, and proceed to clean out the canals. When these are perfectly dry and clean, I then apply a drop or two of the saturated solution of iodoform in ether and quickly pump it into the canals, and afterwards permanently fill the root canals, using a solution of gutta-percha (1 ℥ of this solution of gutta-percha in chloroform and about 1 ʒ of powdered iodoform); I place one or two drops in the pulp canals, and with a smooth bristle force it up to the apex. This solution is succeeded by very thin pieces of previously warmed gutta-percha, which, by means of a little thicker instrument, are forced into the pulp canals until it is completely filled. If the foramen at the end of the root is somewhat large, I saturate a piece of cotton, wound around a smooth nerve broach, with the solution of iodoform; let the ether evaporate; dip it into the solution of gutta-percha and force it into the pulp canals up to the apex of the root, and follow this by small thin pieces of gutta-percha.

### THE DENTAL REGISTER *(April, CINCINNATI).*

"Phosphate of Lime and the Teeth," by Dr. C. M. Wright. The writer thinks we are safe in believing that the Dental Profession accept as plausible and possible the idea that the density of tooth tissues can be increased by proper or special nutrition during the period of early development and during childhood, and that an excess of the phosphate of lime in the food, or administered in medicinal preparations, may be as beneficial to the teeth as it is believed to be to the osseous system at this period. There seems to be no question in the minds of the Profession that phosphate of lime is directly abstracted from the tissues of the teeth and the matter is used in the development of the bones of the growing fœtus; and it is generally believed that the mineral salts leave the teeth in some of the diseases of middle life, as in nervous affections and in wasting diseases from decreased nutrition. He concludes with the following suggestion: Feed your pregnant women with the best preparations of the phosphate; flood them with phosphates during gestation and lactation; flood the children after they appear with phosphates until, by examination with excavators and scalers, you find the enamel and dentine as dense as you could desire; then destroy the pulps of all the teeth, to prevent deterioration from any possible lack of this element, or from possible impairment of nutrition in after-life.

"CARBOLIC ACID," by Frank French, M.D.S. The writer deals with the history and physical characters of carbolic acid; also with its therapeutic uses and its special application in Dentistry.

The "Report of the Fortieth Annual Meeting of the Mississippi Valley Dental Association" occupies 24 pages.

### THE OHIO STATE JOURNAL OF DENTAL SCIENCE

*(April, TOLEDO.)*

"ADDRESS to the Graduates of the Ohio College of Dental Surgery," by Dr. Frank A. Hunter.

"DENTISTRY AND ITS PRESENT STATUS," by Dr. K. B. Davis. Had Dentistry, like Opthalmology, always been taught as a specialty of Medicine, doubtless Dentistry would have made just as much, or more, progress, as it has independently. It was a great step in the elevation of our status when Dentistry was acknowledged by such Universities as Harvard, Michigan, and Pennsylvania, but it was a still greater step when, at the Annual Meeting of the American Medical Association in 1881, Dentistry was formally and fully recognized as a specialty of Medicine. The writer concludes by giving a quotation from Professor Gross's remarks on that occasion.

"THEORIES," by Dr. William A. Johnston. The theoretical Dentist is looked upon with disdain by his, so called, purely practical brother, but let something unusual occur, some case requiring accurate diagnosis or delicate discrimination, and which of the two will be more successful in the treatment? Routine practice is like a boat with but one oar; no matter how hard the rower may work, he makes no headway, but circles round and round. Theory alone would turn the boat in the opposite direction. It is only when theory and practice supplement each other that a man is truly successful.

"PRÆ-NATAL INFLUENCES, as Affecting the Teeth," by Dr. G. H. Cushing. Under what conditions do we, as a general rule, see the reproduction of the species conducted? In no case where either parent is in a perfect physical condition, and often with one or both parents in an absolutely unfit condition, to become progenitors, because of their being in a pronouncedly unhealthy condition. Parents in the last stages of consumption, with incurable diseases of many kinds, with scrofulous diathesis, and those with constitutions utterly wrecked by over-indulgence and long-continued violation of the laws of health, or by reason of repeated attacks of various acute diseases, are continually and always bringing children into the world. What can be expected of the offspring of such parents? Only that their organisms will be to a greater or less extent imperfect, under even the most careful attention to the condition of the mother during the period of gestation and lactation. There can be no question that the habitual use of Sargent's Preparation of Wheat Phosphates, or of the Syrup, by mothers during pregnancy and lactation is likely to prove beneficial to the teeth of the children, and also to those of the mothers; and it should always be prescribed where there is probability of imperfection in the dental organs, either from inheritance or impaired health of the mother. This question should arouse the attention of the Profession to the importance of urging upon all our patients who are about to become mothers the great necessity and the duty of their using every means within their reach that is likely to tend towards the improvement of the teeth of their offspring; and to this end Dentists should ask the co-operation of the family physician, and of the husband, which will be readily and gladly accorded when once its importance is apparent to them.

"Dental Education," by Dr. W. Fraenkel. The greatest damage to the American Dentist of the present time is his inferior education before entering upon the study of Dentistry. Change that, make it obligatory for the student to pass a broader examination, giving satisfactory proof of his qualifications. Do not you think a better preliminary education would enable us to do away with the roughness that is so much practised by our Profession to-day, and that lowers the respect of our patrons? Let the time for study be extended, and be made equal to the three years' medical course; and do not forget that a year has twelve months and not four or five as our Colleges count.

"Physiological Action of Nitrous Oxide Gas," by Dr. S. E. Lightcap.

"Prepare ye the Way," by J. H. S. This article deals with the desirability of medical legislation in the State of Indiana.

"Our Profession," by Dr. G. North. The writer thinks there are too many colleges that fall short of proper requirements, their grade is far below the standard of a true profession, and there are but few institutions that stand where they should. State Societies should require a higher degree of education for membership and not receive all that apply simply to increase the list of members, and thus place those that have stepped into our ranks with a few months' tuition on an equality with those that have worked and toiled for years to prepare themselves for their calling.

"Sensitive Dentine," by Dr. C. W. Beard. The writer thinks there are but few teeth that cannot be excavated and filled without local medication if we earnestly labour for that end. Where it is necessary to use an obtunding agent he coats the cavity with a film of gutta-percha.

## NEW ENGLAND JOURNAL OF DENTISTRY

*(April, SPRINGFIELD).*

"The Bacteria," by Dr. C. S. Boynton. The writer accepts the plant nature of bacteria, and leaves analysts to settle their exact phylogenetic relationship. Putrefaction may be defined as a chemical process caused by bacteria. Death does not, as is generally supposed, cause putrefaction, but rather it is caused by the life of these invisible organisms. The discovery of these low forms of life in the mouth is not of modern origin, for mention is made of them in the writings of Leeuwenhock, written two hundred years ago (in 1682). Having alluded to the works of Magitôt, Leber and Rottenstein, Underwood and Mills, and Miller, the question is asked, What has been settled? No question of this kind can be settled by a war of words; patient continued research, in which all who can should take part, will in time bring forth good results. In all the discussions that he has read in the journals since the germ theory of caries has been brought forward, he has noticed that the opponents—and sometimes the supporters—of the theory came to the work without any definite knowledge of the life history of the bacteria.

"CRITICAL REMARKS upon the Mis-statements as to Inter-Dental Splints in the Surgical Treatise of Professor D. Hayes Agnew, M.D.," by Dr. T. Brain Gunning.

"WHAT VULCANISED RUBBER DOES," by L. P. Haskell. Now while there is "mercurial poisoning" from vulcanite plates, which I can demonstrate beyond all peradventure, that is comparatively rare; but the main evil arises from their non-conductibility, so that the retention of the heat under the plate constantly inflames the membrane, and not only produces a very uncomfortable feeling in many mouths, but produces most serious results in the undue absorption of the alveolar process to such an extent that thousands of mouths are ruined for plates, there being nothing left but a flexible ridge of thickened membrane. The same results follow the use of celluloid.

"WHICH WAS FIRST, the Hen or the Egg, the 'Bug' or the Acid?" by Dr. F. Y. Clark. The writer criticises the recently published papers by Dr. Miller on the Relation of Germs to Dental Caries.

"SUBSTITUTES for Lost Jaws," by Dr. W. Kay, is an article translated from the *Zahntechenische Reform.*

## OBITUARY.

THE announcement of the sudden death of Mr. ALFRED ROGERS, partner with Dr. CUNNINGHAM, of Cambridge, will be read with much regret. Mr. ROGERS was taken ill on the 5th April, suffering from an axillary abscess. This was opened on the 8th, and, after consultation with Prof. HUMPHRY, a further operation was performed on the 12th, but he died at an early hour the following morning.

After a short term at the Dental Hospital in Soho Square, he went to Cambridge some nine years ago, where quickly he built up a large practice, and subsequently entered into the partnership already mentioned. He was a member of the Odontological Society, and was one of the original members of the Eastern Counties Dental Association, afterwards joining the parent Association.

He leaves a wife and six children, and his premature end is deplored by a large circle of friends and patients.

## GOSSIP.

At a recent Meeting of the Balloon Society of Great Britain, Mr. W. H. Le Fevre read a Paper on "Earthquakes: their Causes and Effects. "He said that, notwithstanding the frequency of earthquakes, and although we possessed accounts of many thousands of instances of such disturbances of earth, there still remained a great deal to be done before they could thoroughly understand the nature of the phenomenon, together with the effects and relations with other natural phenomena. It was only within the last few years that this study had made any steps in advance, but the progress was of so important a character that they might hope soon to arrive at a solution of some interesting questions in this chapter of natural history. From the impression produced upon our senses, the forms of mechanical effect of these different kinds of earthquake were distinguishable. In the first place, there was the disturbance or vertical shaking movement, of which the shock was from below upwards. Secondly, there was the disturbance or horizontal concussion, with a lateral shock; and, thirdly, there was the undulating movement, during which the ground oscillated as if it were agitated by waves. Having given some examples of the mechanical effects of these various phenomena, the author said that the shock of earthquakes was propagated with a velocity of from 350 to 500 mètres per second. In some exceptional instances this rapidity increased to 800 mètres, or diminished to 150 mètres per second. Thus the average was about the same as average velocity of sound—namely, 340 mètres a second.

Prof. Flower, who in 1861 was appointed Conservator of the Museum of the Royal College of Surgeons of England, has been appointed Director of the Natural History (British) Museum, South Kensington, Prof. Sir Richard Owen having retired.

Appointments.—Mr. F. Sherburn, L.D.S.I., Dental Surgeon to the Leeds Public Dispensary; Mr. Clifford Batten, L.D.S,I., Dental Surgeon to the Kidderminster Infirmary; Mr. Henry W. Mayne, L.D.S.I., Dental Surgeon to the Plymouth Dental Dispensary.

Mr. Coleman will distribute the Prizes to the successful Students at the National Dental College, at 8 o'clock, on Monday, the 19th inst., at the Beethoven Rooms, Harley Street.

THE

DENTAL RECORD.

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# SOME OF THE DRUGS USED IN DENTISTRY.

*(A Paper read before the Students' Society of the National Dental College).*

By CHAS. W. GLASSINGTON, M.R.C.S., L.D.S.Edin.

THE subject of my Paper this evening is one which is of great value to the Dental Surgeon, and yet during the two, three, or four years a man takes to qualify himself in Dental Surgery, it receives little or no attention from him. This is partly the fault of the student and partly the fault of "the powers that be." A student desirous of obtaining the Diploma of L.D.S.Eng. is required, amongst other things, to attend one course of Materia Medica, and during that course what does he learn to help him in the Profession he is ultimately going to follow? Little or nothing at all. He will, if he be diligent enough to attend all the lectures, and attentive when he does attend them, learn that iron, matico, and tannin are hæmostatics, and consequently useful in hæmorrhage after tooth extraction. That arsenic is used for destroying exposed pulps; that carbolic acid and creasote are largely used by Dentists; that croton chloral, chloride of ammonium, and tincture of gelsemium are good for neuralgia; and other *important* facts. But of the action of these drugs in particular relation to the teeth he gets no information beyond what he acquires during his practice at a Dental Hospital, or from what he reads in the Dental journals, or from the only work (that I know of) on Dental Materia Medica—that by Mr. Stocken. Again, if he reads the text books on Materia Medica, he will find passages like this:—"Externally applied creasote allays toothache depending on caries." Now, although this is true to a certain extent, how very meagre that information is when we know how largely this drug is used by Dentists.

During my late appointment as House Surgeon at this hospital, I was on several occasions much impressed by the ignorance shown by some of the students of the different drugs they were using. In dressing "a dead tooth" it was a matter of total indifference to some what they did it with. Eucalyptus, carbolic acid, or creasote, whichever they thought of first, but why they used one or the other they had no definite reason. Now this I maintain is the fault of the "powers that be," and the sooner a Chair of Dental Materia Medica is founded at all our Dental Schools the better it will be for the future of our Profession.

I shall endeavour as far as I can to make this Paper as practical as possible, and give you very little theory. I do this for two reasons viz., that time will not permit me to say much upon each drug; and secondly, it will not make you think that I am giving a lecture.

The first drug I shall put before you is ARSENIC, and is one on which alone anybody could write an interesting Paper for discussion. Arsenic is an irritant, escharotic, and powerful antiseptic, the latter fact being proved by the injection of bodies for dissection. I do not intend starting the question whether arsenic should or should not be used for destroying pulps, although, for my own part, I am quite of opinion that when a pulp or part of one can be saved it is our duty to save it. We all know that to preserve the life of a tooth we must preserve the life of the pulp and of the peri-dental membrane, and in using arsenic we destroy one if not both. Broadly speaking, the only indication I shall put down for its use, is when the whole of the pulp is inflamed and pus has formed.

Assuming we have decided to destroy a pulp with arsenic, let me impress on those who are just commencing their hospital work the following hints:—

1. Apply the rubber dam.

2. Carefully dry the cavity first with cotton wool or bibulous paper, and afterwards with the hot air syringe.

3. If the exposure is small enlarge it with sharp excavators, as arsenic applied to a small exposure only increases the inflammation and pain.

4. Apply the arsenic (about the $\frac{1}{16}$ gr.) on a piece of cardboard sufficiently large to prevent any pressure on the pulp, and soaked either in carbolic acid or creasote, cover with copal varnish, and fill with Hill's gutta-percha. I prefer this to mastiche, as you are liable to drag the mastiche away when taking off the rubber; besides which it is a safer filling. Whatever fluid you use to convey the arsenic to the cavity, be careful not to have an excess, as you are liable to have this excess squeezed out and with it some of the arsenic.

5. Do not use it in young children unless you know the tooth is fully formed, for in destroying the pulp of a growing tooth you stop its growth.

6. Should a pulp be greatly inflamed use an application of creasote, tannin, and morphia, to reduce the inflammation before using the arsenic.

7. Do not use it in excess as the effects spread to periosteum, bone, and neighbouring pulps, and may cause their destruction.

Mr. W. E. Harding brought a case before the Odontological Society on December 5th, 1881, in which he had carefully treated a pulp with arsenic, and in three days the patient had all the symptoms of arsenical poisoning.

Mr. Coleman has lately brought before the notice of the Profession a method of treating so called "dead teeth" with arsenic. In those cases where the pulp has sloughed away, the canal cavities filled with puriform fluids, the dentine itself being moist and very offensive, and, as a rule, accompanied with periodontal irritation, due to the presence of septic substances, he has used arsenic with better results than ten or twenty applications of carbolic acid or creasote. His mode of procedure is this:—He simply clears out the pulp cavity, washes with carbolic acid, and applies arsenic precisely as if for destruction of a pulp, laying the application over the orifice or orifices of the fang cavities, and then filling over with oxychloride of zinc. After an interval of two or three months, if the filling is removed, the pulp and fang cavities will be found dry and perfectly sweet. This method of treating teeth is one which I should not feel inclined to differ from, coming as it does from such an authority; but the fact is I had myself partly done the same thing in two or three cases, before I was aware Mr. Coleman was pursuing that course of treatment. But in the few cases I tried it, it was more from necessity, and because I did not know what else to do. I well remember two cases, both were upper molars, distal cavities with suppurating pulps. The patients, who were going into the country, refused to have them extracted, and wanted them stopped. So after applying the rubber dam and carefully excavating, I placed a large cap of cardboard, on one side of which was a paste of creasote, morphia, and arsenic, over the pulp cavity, filled with osteo, and told the patient that in the event of any pain or swelling to go and have the tooth out. Both cases did well, and one came back a short time ago to have the tooth filled up again, the osteo having worn down. The remains of the filling still covered the pulp cavity, so I simply put in another filling as the patient begged me not to disturb it, it being so comfortable. My experiences are not sufficient to enable me to speak well of this mode of treatment; but when a gentleman like Mr. Coleman brings forward any addition to our knowledge of Dental Surgery, we may be sure he has good reasons for doing so.

Arsenic is also useful for allaying the pain of sensitive dentine in *shallow cavities*. Of the chemical and physiological action of this drug I must refer you to Dr. Arkövey's experiments, which are published in *Transactions of the Medical Congress*, and also in the DENTAL RECORD for February 1882.

The next drug I shall speak of is CARBOLIC ACID. This is a powerful antiseptic, caustic and escharotic. In Dentistry it is used chiefly in a diluted strength as an antiseptic for dressing the canals of teeth. Strong Carbolic is also useful for allaying the pain of Sensitive Dentine, which it does by coagulating the contents and sealing-up the ends of the dentinal tubes; and by applying it to the gum after extraction it deadens sensibility. When used for capping exposed pulps it should not be stronger than 1 to 20, as a solution of greater strength acts as an irritant, destroys the layer of odontoblasts, and so probably prevents the normal formation of secondary dentine.

In combination with Glycerine about 1-12, it may be used to increase the secretion of the palate for the purpose of retaining suction plates, which it does by stimulating the action of the mucous-follicles. Of its value in the treatment of alveolar abscess I cannot speak, preferring another drug I shall mention later on. It is very useful as a lotion, when diluted, for ulcerations of the mouth, and with Glycerine (ʒ ss. to ℥$_1$ of Glycerine, and diluted with about 4 ℥ to 6 ℥ of water) is good in cases of sore throat with relaxed uvula and soft palate. In cases after the removal of tartar the edges of the inflamed gums are greatly improved by the application of Carbolic Acid. Should any of you be unfortunate enough when using it to allow any to come into contact with the cheeks or lips of your patient, its injurious effects are greatly counteracted by anointing the parts with olive oil.

Creasote is a drug I scarcely use by itself. It is a powerful deodoriser, antiputrescent, and antiseptic, and acts locally as a caustic by coagulating albumen in solution. The chief use I have put it to is in cases of caries of the temporary teeth which are painful, and which require stopping to prevent their too early removal. It is said to have great effect in the tooth-ache of pregnancy.

The late Dr. Dean, of Chicago, said that for alveolar abscesses with fistulous opening on the gum, Creasote soon effects a cure; but in those cases where there is no opening, neither that nor Carbolic Acid should be used, as these drugs coagulate the albuminous ingredients of the pus, and affect its fluidity and thus increase the difficulty of drawing it through the apical foramen; but after the contents of the sac are got rid of, then Creasote may be used with advantage.

Eucalyptus.—This drug is one in which I have the greatest faith as an antiseptic. It possesses none of the irritating properties of Carbolic Acid or Creasote, and is not a caustic. It is highly destructive to all low forms of organic growth; and, according to some, is three times as strong as Carbolic Acid in preventing the formation of bacteria. Professor Lister says, "That while entirely free from any toxic or locally irritant effects it is a perfectly trustworthy antiseptic." On the other hand, Dr. Schlemitz, of Arnsberg, says it is not a powerful antiseptic. Mr. Stocken, in his work on *Dental Materia Medica*, says, " apart from its antiseptic properties it is said to be a local anæsthetic, lulling the sensibility of tooth-ache and sensitive dentine." I have used it with great success in all cases of chronic alveolar abscess in the following manner:—I first of all apply the rubber dam, clear away any particles of food or softened dentine, and then bathe the cavity with Eucalyptus. I then proceed to open up the canals using, as far as possible, all antiseptic precautions, for example, bathing the cavity with the oil, using instruments the points of which have been dipped in the oil, and then when I have opened the canals, pumping up more Eucalyptus on a Donaldson's probe. If the tooth is not very tender, and the patient can bear it, I shape the cavity the same day; but, if not, I pump up more Eucalyptus, the antiseptic and antiputrescent qualities of which are greatly increased if used with Iodoform, either in solution, or by carrying it up the canal on some cotton-wool soaked in Eucalyptus, and seal the cavity with Hill's gutta-percha. Again, I prefer gutta-percha to mastiche, as in these cases it not only keeps the cavity much cleaner, but the fluids of the mouth have less power of permeating through the filling, and thus preventing the introduction of any fresh germs. When I next see my patient—say in two days—I again apply the rubber dam, remove the temporary filling, and if the canals are tolerably sweet and there is no sign of pus formation, I shape the cavity, providing I have not done it before, pump up more Eucalyptus, take a small piece of cotton-wool soaked in it and force it up to the end of the canal, so that it shall occupy only a small portion of the end of the canal. I then take some small pieces of Hill's gutta-percha, dipped in the oil, and fill the remaining portion of the canal, and on the top of this put either gutta-percha or one of the osteo fillings, and direct my patient to come and see me at the end of six months to have a permanent filling inserted.

Those cases which I have seen at the end of that time, have all been successful. I ought to mention that in some cases it requires more than the second visit before you can put in the temporary filling; for instance, at times I have noticed when taking out the first dressing you will find a small bead of pus come down. In a case like this a third or even fourth visit will be necessary before the tooth can be stopped.

IODOFORM possesses strong antiseptic powers, and is also slightly anæsthetic and sedative in its action. I have seen it used in this hospital in cases of chronic alveolar abscess, but success with it was not so great as I anticipated unless used with Eucalyptus. This drug has the credit of not possessing any irritating properties, but Dr. Phillips, late lecturer on *Materia Medica* and *Therapeutics*, at

Westminster Hospital, to whom I am greatly indebted, in more ways than one, for my knowledge of the inorganic part of the *Materia Medica*, says:—"In certain cases Iodoform is an irritant, viz., when applied to abraded surfaces, especially inflamed ulcers."

The great objection to its use is its odour, but this to a certain extent may be covered with one of the following drugs—Balsam of Peru, Eucalyptus, Otto of Rose, or Tannic Acid; but none of these cover it entirely—Balsam of Peru being the best.

IODINE and ACONITE.—I shall speak of these two drugs chiefly in combination as they are generally so used by Dentists. As you all know they are most efficacious in Periostitis.

The following hints I venture to hope will not prove unacceptable:—When applying them to the gum always keep the fluids of the mouth away from the part painted till the Alcohol has sufficiently evaporated, or else the application will be washed away. The part always assumes a metallic lustre when the Alcohol has evaporated.

Be careful when using it not to have an excess of fluid on the cotton-wool or brush, for fear any of the superfluous fluid should find its way down the throat, as very small doses of Aconite have proved fatal.

In the event of any serious effects happening to you, the following are some of the antidotes—Animal Charcoal, an emetic of Sulphate of Zinc (do not be afraid of giving too much), Brandy and Ammonia internally; stimulation externally, subcutaneous injection of Atropine.

Should you prescribe Aconite as an external remedy for Neuralgia, warn the patient to keep the eyes closed when using it; or extensive irritation may be set up in the eye.

Do not forget that Fleming's Tincture of Aconite is five or six times as strong as that of the B. P. Iodine by itself is used in cases of Ranula, by swabbing out the cyst after it has been opened and its contents evacuated. For my part, I much prefer to stuff the cavity with lint and so set up inflammation and granulation. In Gingivitis it is good after the removal of Tartar, for touching-up the edges of the gum; but as I pointed out before I use Carbolic Acid instead.

Locally applied it acts as a stimulant, escharotic and absorbent. It is useful in all forms of Periodontitis as it promotes absorption of all abnormal material by stimulating the absorbents to increased action, promoting and hastening healthy action; and as a counter-irritant by directing the circulation to another part.

IRON.—In speaking of this drug I shall confine myself only to its action as a hæmostatic. For the last eight years I have not used anything else but Liquor Ferri Perchloridum to arrest hæmorrhage after tooth extraction, and have never found it fail; consequently, I am in a position to speak of its value.

My mode of procedure is simply this:—As soon as I see the patient I mop out the cavity, clear away all clots, make the patient wash the mouth out well with cold water, and plug with a plain piece of cotton-wool. I then take another piece of wool soaked in the Liq. Ferri Perchlor., remove the first piece, and plug the socket tightly, placing a good pad on the top of this, and tell the patient to keep the teeth together. If necessary I bind up the jaw.

Then just a few precautions to the patient, such as keeping quiet, keeping in an upright position, and taking everything cold.

I use the strong solution of the perchloride in preference to the tincture, as its astringent effects are greater, but it is more acid and often acts as an irritant, consequently in certain cases it may be used with a little water or glycerine.

Its great objection to surgeons using it is that it prevents union by first intention. Iron acts a true styptic on the blood; it causes a coagulum to form—it narrows both arteries and veins at the place of application, whilst the neighbouring vessels become dilated. Its action varies, however, according to the strength and kind of the preparation used.

ALUM acts as a simple astringent by contracting the arteries and muscular fibres of the part touched by it, and renders the surface pale and dry. If there is not sufficient fluid present to saturate the Alum, it affects the deeper tissues and acts as a caustic. Most astringents favour the action of Alum, but as Tannin decomposes it, they should not be used together, as they may prove less astringent.

It is useful in Simple Stomatitis; but in Ulcerative Stomatitis Chlorate of Potash is a specific. As a hæmostatic I never employ it; but care should be taken not to use it too long or too strong, especially in scrofulous patients, as it may cause unhealthy ulceration.

TANNIC ACID is a most powerful external astringent, and there are many before me this evening who use it in preference to any other drug. Applied externally it is preferable to Gallic Acid, but for an internal astringent Gallic Acid should be given, as Tannic Acid becomes converted in the blood into Gallic Acid and grape sugar, and therefore only part of it is available. For spongy gums it is an useful application, and combined with Creasote it is frequently used in ulceration of the pulp.

MATICO, either in leaf or powder, is an effective styptic; but its power is supposed to be due to the mechanical structure of the leaf which, when applied, should have the underside placed next to the bleeding surface.

Chloride of Ammonium, Tincture of Gelsemium and Croton Chloral are used by the Dental Surgeon for the relief of Neuralgia.

I use these drugs as follows:—A patient comes to me suffering from neuralgia, I at once prescribe Ammonii Chloridum gr. ×××, Tr. Limonis ʒ ss. (to cover the nauseous taste of Amm. Chlor.), Sp. Chloroformi m. xv., Aquæ ad ℥j., every three hours. Should this not give relief in three doses it should be discontinued; and then I give Croton Chloral gr. iij. to ×, Sy. Tolu. ʒj., Aquæ ad ℥j., and I have never found one of these two fail me. Of the Tincture of Gelsemium I have no knowledge beyond what I have read and heard from others; but its value as a sedative in neuralgia is, I believe, very great.

Bromide of Potassium.—This drug is not much used by Dentists, but I mention it to show its great value in convulsions due to teething. Dr. Phillip's in his work on *Materia Medica*, says, "In the restlessness and nerve irritation on convulsions, sometimes attendant on Dentition, bromides are exceedingly useful, so that the gum lancet is scarcely ever needed." In a child, say 12 months old, with convulsions, I give Pot. Brom. gr. iij., Sy. Simp. m ×, Aq. Anethi. ad ʒj., every three or four hours, at the same time I order a small dose of Calomel as a purge, hot baths, and ice to the head.

Chlorate of Potash is another valuable drug to the Dentist in all forms of inflammation of the mouth. In Ulcerative Stomatitis given both internally and as a gargle it acts as a specific, and the same must be said of it in Tonsilitis, particularly when combined with the Tincture of the Perchloride of Iron.

The last drug I shall speak of is the Permanganate of Potash. This I conceive to be one of the most valuable medicines in *Dental Materia Medica.* I use it for two things, first for testing whether in a carious tooth the offensive smell comes from a suppurating pulp or from the gum.

Its other great use is when a patient comes with a mouth full of suppurating pulps and polypi. The odour from these is simply unbearable, but with a gargle of Pot. Perman., the Dentist is enabled to bend over his patient with a certain amount of comfort.

In conclusion, I must thank you for the very patient hearing you have given me during a somewhat lengthy Paper. I could not go so deeply into the action of some of the drugs as I should have liked, on account of the time, and some I have had to leave out all together. I feel quite sure that lectures on *Dental Materia Medica* and *Therapeutics* at our Dental Schools are greatly needed. Should this ever come to pass the Dental Student would not only have the opportunity of turning out a better Dentist, but would be able during his Student's career to use and judge of those drugs which, under the present system, he seems to have such a very vague idea.

# ELECTRICITY: AND THE ELECTRIC LIGHT: IN REFERENCE TO DENTISTRY AND SURGERY.

By C. J. BOYD WALLIS, L.D.S.Eng., &c.

### PART X.—BATTERIES—*Continued.*

GALVANO-CAUSTIC BATTERIES.—We are indebted to M. Grenet, of France, and Middeldorpff, of Germany, for the earliest batteries for the application of the galvanic cautery. Grenet's battery is worked by bellows, and is said not to work very satisfactorily.

*Middeldorpff's Battery* is arranged on Bunsen's principle and consists of four large cells with zinc carbon elements excited by diluted sulphuric acid in the outer, and strong nitric acid in the porous cell. The connection of the elements is made by means of wires dipping into cups containing mercury, so that one or more cells, as required, may be readily brought into action.

*Dr. Tibbits* has introduced a hospital galvano-caustic battery in which the elements consist of platinum and zinc ; the cells of vulcanite are so arranged that they may be securely covered to prevent the spilling of the fluid when the battery is moved from one place to another. A graduated stem, divided into twelve degrees, is so arranged that when the elements are introduced into the fluid it (the stem) rises above the surface of the element board and enables the operator to read off at a glance, and to regulate, the heating power of the cauteriser.

*Messrs. Mayer and Meltzer*, ot London, supply a battery for the same purpose which has been highly spoken of, and in which the unpleasant odour of the strong nitrous fumes has been obviated. This battery consists of three large ebonite cells with large zinc carbon elements attached to a bar by means of which they may be bodily removed from the cells when not in use. The exciting solution consists of bichromate of potash, sulphuric acid, and water.

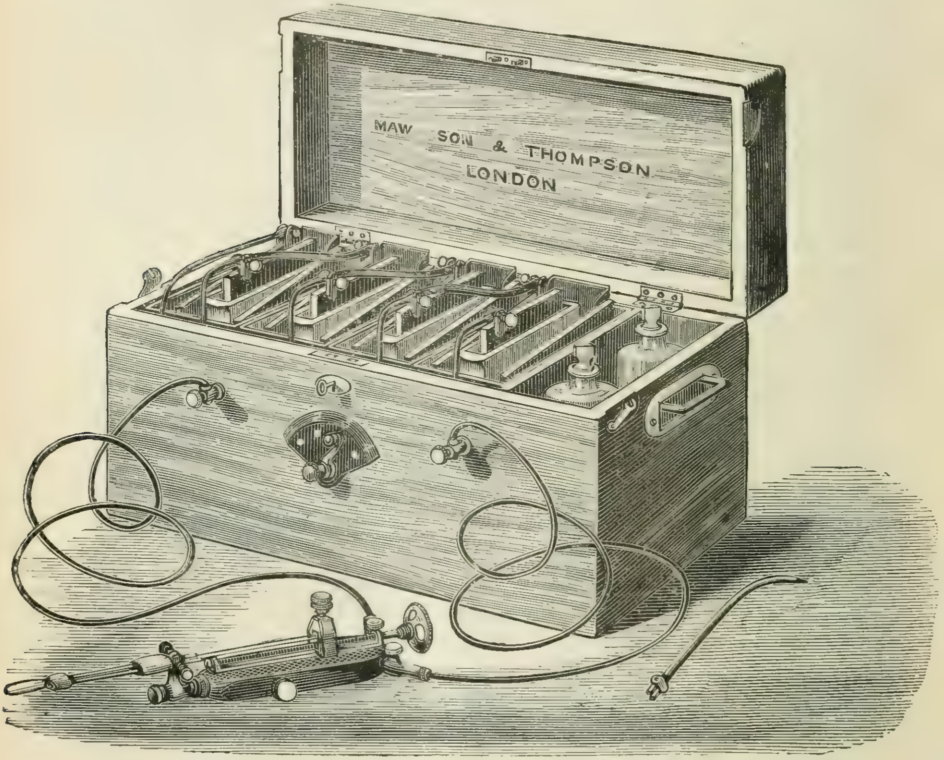
Messrs. Maw & Co. supply a portable galvano-caustic battery, which has recently been introduced by Dr. Boecker, of Berlin. It consists of a case containing two glass cells, into each of which four carbon and three zinc elements are placed ; the elements are attached to a wood plate, which forms the inner lid or covering to the case and carries the binding screws. The cells rest upon a moveable support, to which is attached a brass rod with a handle, by means of which the cells may be raised or lowered, and the intensity of the current ncreased or diminished, as desired ; the brass rod is pierced with a number of holes, so that it may be fixed by means of a pin in any position necessary. The exciting solution consists of—

| | |
|---|---|
| Bichromate of potash .. .. .. .. .. | 1 part. |
| Distilled water .. .. .. .. .. .. | 10 „ |
| Sulphuric acid .. .. .. .. .. .. | 2 „ |

And one teaspoonful of bisulphate of mercury is added to each cell to assist in keeping up the amalgamation of the zinc. So charged, it is claimed that this battery will run for three months with the same solution.

Maw, Son & Thompson's Galvano-Caustic Battery.—Fig. 32.

Fig. 32.

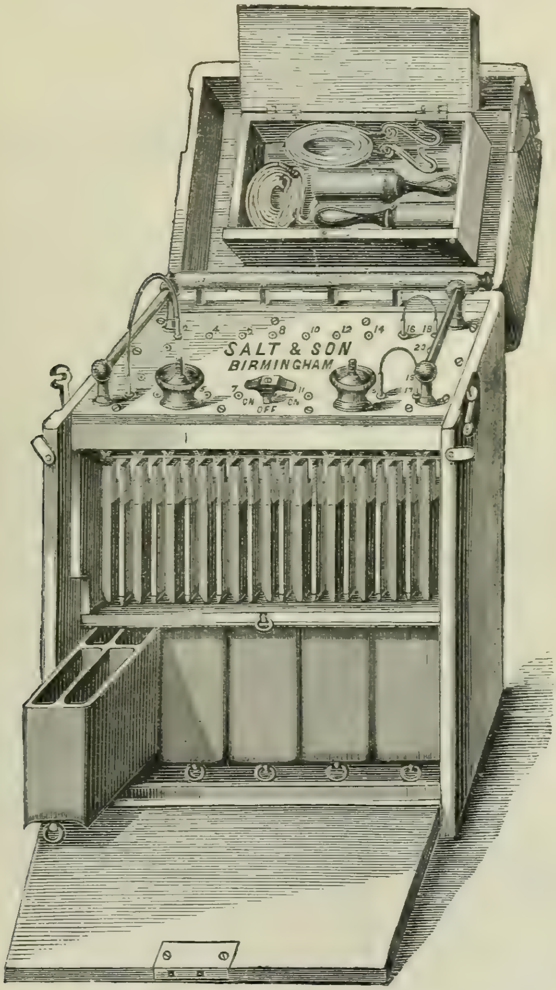


This is a portable 4-cell battery of Grove's elements, fitted with two bottles for containing the acids; on the front of the case is a dial-plate with handle for regulating the power of the current by connecting and bringing into action one or more cells as required.

Stöhrer's Batteries, manufactured by Dr. E. Stöhrer, of Dresden, are of two forms; the one is intended for hospital and the other for private practice, the principle in both being the same, and they differ chiefly in regard to size and portability. These batteries are very simple in construction, satisfactory in use, and not liable to get out of order. They are composed of from 20 to 30 cells, with carbon and zinc elements and dilute sulphuric acid, with a pinch of bisulphate of mercury in each cell for the excitant. Glass cells are employed in hospital and vulcanite cells in private batteries. Most of the medical constant current batteries now in use take their origin from the

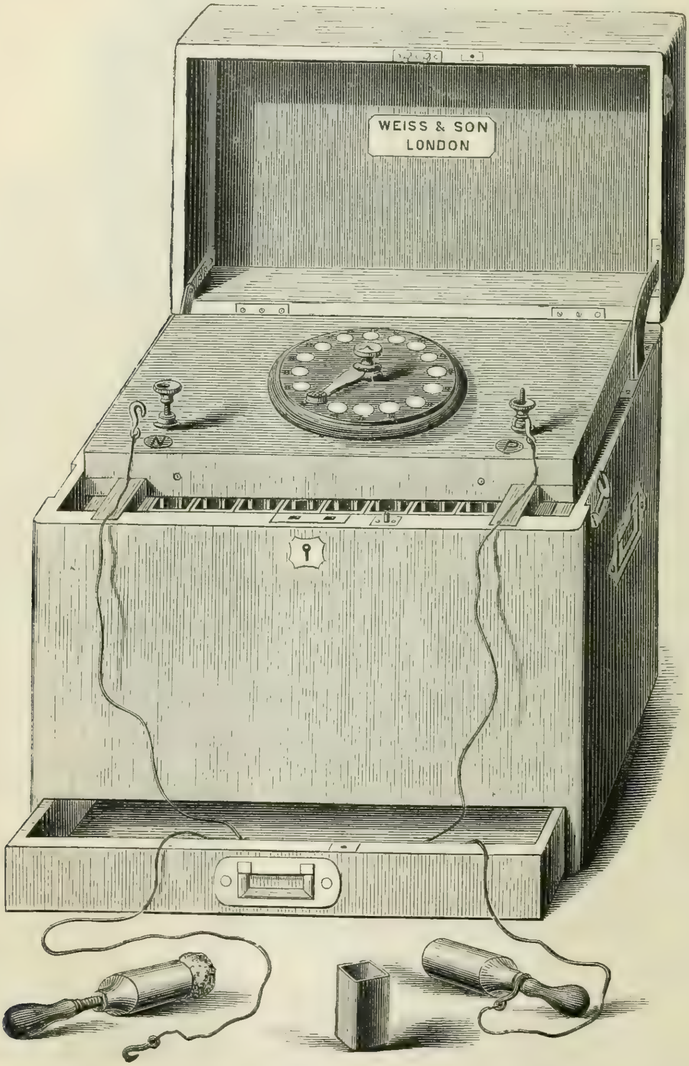
Stöhrer models. An improved form of the Stöhrer battery has been introduced by Messrs. Salt & Son, *of* 21, *Bull Street*, *Birmingham*, to the excellent qualities of which my attention was directed some months ago by my late friend Dr. McOscar. The battery referred to is illustrated by Fig. 33, and consists of a handsome mahogany oblong case, with flat top and hinged front, which falls forward to allow access to the cells. The elements are the same as in the Stöhrer cells, and are suspended from an ebonised element board, removable by means of brass handles fixed at each end. The exciting fluid is the same as in the Stöhrer batteries. A battery of the size illustrated is composed of 20 vulcanite cells, arranged in sets of four, which slide

Fig. 33.



by five clips on to five horizontal plates attached to as many vertical rods with cross handles, by means of which any number, in gradations of four, may be drawn up for use. To prevent spilling of the liquid when not in use a wooden board, faced with india-rubber, slides on to the cells when the elements are withdrawn, and so effectually closes them. Twenty brass sockets, numbered, and each one in connection with the cell below, are arranged on the surface of the element board, together with two screws for the reception of the conducting wires, and a commutator for reversing or arresting the current. The com-

Fig. 34.



mutator is a vulcanite button, so marked as to clearly show when the current is on, and which is, at the time, the positive or negative pole, the poles being reversed by half a revolution. The rheophores, conducting wires, etc., are contained in a small case in the lid.

FOVEAUX'S BATTERY.—This is a constant current battery of 50 elements, designed by Mr. Foveaux, of the firm of Weiss & Sons. It is arranged on Smee's principle (platinised silver and zinc), for which the preference is given on account of the fragility of the carbon element which is used in other forms of battery, and also the fact of the latter requiring such a strong solution. This battery is very efficient and reliable, capable of standing a great deal of hard work, and is not liable to get out of order. For diagnostic purposes it leaves little or nothing to be desired; it is portable and well constructed. Fig. 34 (see p. 252) illustrates the battery complete and ready for use.

Fig. 35 the elements of zinc and platinised silver, attached to an element-board, with cover and dial or commutator.

Fig. 35.

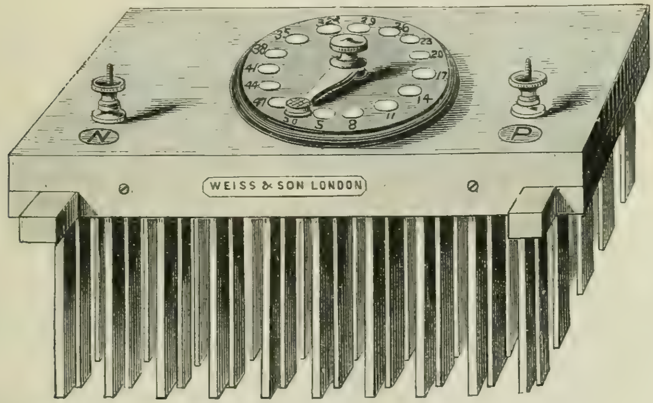


Fig. 36 the tray containing the cells.

Fig. 36.

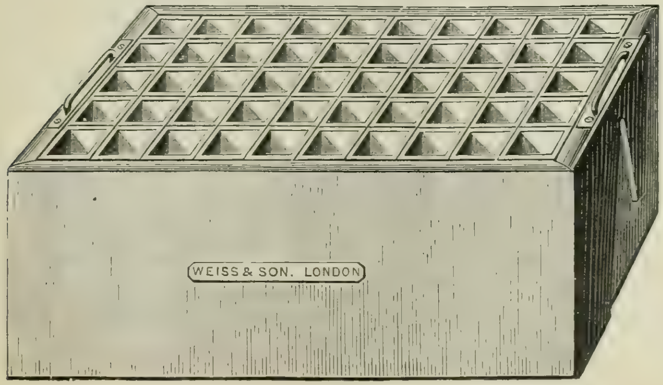


Fig. 37.

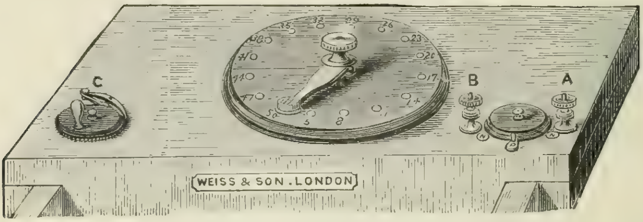


Fig. 37 represents the element-board supplied with a curren reverser and current interrupter. Both terminals A and B are placed by the side of the reverser. When the index of the latter, which is marked POS. (positive), is turned on to and covers the plate NEG. (negative) nearest to terminal A, the latter is *positive* and B is *negative*. If the index covers NEG. near terminal B, the latter becomes *negative* and A *positive*.

C is the interrupter. To use this it is only necessary to turn it round in either direction.

The battery is put into action by raising the tray containing the cells by means of a lever movement, which brings the fluid in contact with the elements.

The cells are charged with dilute sulphuric acid in the proportion of 1 to 30. The current is regulated by turning the index on the dial, the figures opposite to each stud in the dial indicating the number of elements brought into action.

Weiss's Improved Faradic Battery is recommended for the employment of Faradism. It (Fig. 38, see p. 255) consists of, firstly, a battery of one cell for the generation of the current, in which the elements are platinised silver and zinc, and the exciting fluid diluted sulphuric acid (1 acid to 10 of water).

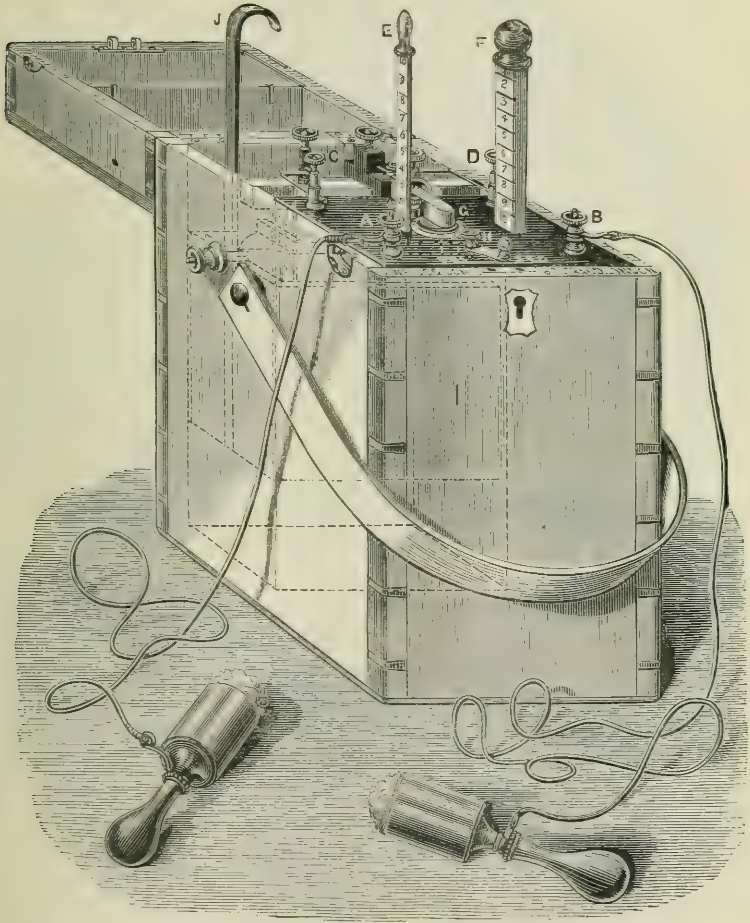
2. The induction coil consisting of primary and secondary coils, the former being composed of stout, the latter of fine, copper wire, covering a bundle of soft iron wires, and forming a temporary magnet, their respective currents being multiplied or reduced by raising or lowering the rod C.

3. The interrupting hammer, G, which, by constantly making and breaking the current, creates the phenomena of induction set up in the coil.

4. The commutator, which enables the operator to change from the primary to the secondary current without having to shift the conducting cords, as in most Faradising machines.

In using this battery when the primary current only is required the commutator H has to be turned on to the stud opposite the letters P R I, and when the secondary is required the commutator must rest on the stud opposite the letters S E C. The power of the primary current is regulated by the rod E, the minimum strength being obtained when the rod is entirely drawn up, and the maximum when it is pushed down. The secondary currents are regulated by the rod F, but in this case the greatest power is obtained when the rod is quite drawn up. The strength of the secondary currents is further regulated by drawing up the primary rod E more or less.

Fig. 38.



The beat of the contact-breaker, which should be very regular and quick, is adjusted by the screw G.

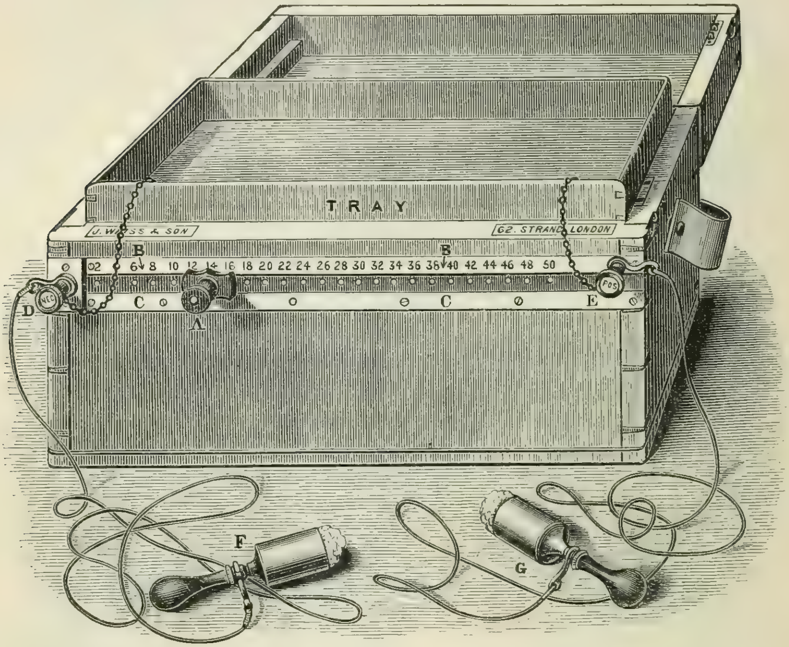
The absence of the spark at the contact-breaker, when not due to oxidation, is an indication that the battery requires recharging.

This battery is simple in arrangement, portable, and little liable to get out of order.

Weiss's Constant Current Battery is made up with Leclanché elements, it is simply constructed, and its mechanical arrangements are not likely to get out of order.

In this battery, Fig. 39, the elements, which are covered by the tray (for rheophores, etc.), are connected with the platinum covered pins which are seen between the brass plates B B and C C. The regulator A travels between these plates and makes contact at the same time with one of the platinum covered pins, thus connecting any desired number of elements with the sponge-holders which are attached to the terminals D and E without interrupting the continuity of the current. This battery may from time to time require the addition of a little water, and the cells require recharging with a saturated solution of salammoniac about every six to twelve months.

Fig. 39.



(*To be continued.*)

# FERMENTATION IN THE HUMAN MOUTH; ITS RELATION TO CARIES OF THE TEETH.

By. Dr. W. D. Miller, Berlin, Germany.

*(Continued from page 162.)*

If we infect a beef-extract-sugar solution with carious dentine, as described in the February number of this journal (*Independent Practitioner*, and also page 120 of Dental Record), using every possible precaution to obtain perfectly pure material, and to prevent the access of germs from without, and keep the solution at thirty-seven degrees Centigrade, we may observe the following phenomena:—In from eight to ten hours the solution will show a slight cloudiness, which at no time, however, amounts to complete opacity. Tested with litmus paper, it will be seen that the acid reaction has already appeared. In fifteen to twenty hours the fermentation will generally have reached the most active state, and soon afterwards a colourless, flocky precipitate will begin to form on the bottom of the vessel, accompanied by a corresponding clarifying of the solution, and a diminution of the fermentive activity. After the lapse of forty-eight hours the sediment will have completely formed, and the solution will be almost as transparent as when the experiment began.

The time required for the completion of this series of phenomena will, however, naturally depend somewhat upon the amount of dentine taken for the infection, and the amount of the solution used.

Impurities in the culture manifest themselves in various ways; it may be an excessive cloudiness of the liquid, or by the formation of a skin upon the surface of the solution, or the failure of the latter to become clear after the lapse of the regular time, etc., etc.

Dentine is an excellent medium for separating the different fungi found in the mouth, the most of them not being able to exist in the deeper parts, partly on account of the acidity of the medium, partly on account of the lack of free oxygen. We may, therefore, with the proper amount of care, obtain material of such purity as to produce a pure culture in the first generation.

If we microscopically examine the sediment which has formed on the bottom of the vessel, we shall find it to consist of cocci and diplococci, either single or in chains; in either case without motion. Under a low power they appear round and regular; with $\frac{1}{18}$ oil immersion they are seen to be round or oval, regular or irregular, involuted, presenting the most various shapes and sizes. I have never been able to detect the existence of spores, and reproduction takes place only after the scheme presented in the illustrations. A coccus which may be round in the beginning, by extension in one axis becomes oval or elongated ; soon after it shows a contraction in the middle, resulting in the production of a diplococcus, or two cocci, each of which may produce two cocci in the same manner.

We find, consequently, in a chain taken from a growing culture, some of the cocci round, others oval, some of the diplococci but slightly contracted, while in others the contraction amounts almost to a complete division. Frequently the cells acquire a pronounced bacterium form, so that if they did not occur in the same chain with the ordinary forms, one would be in doubt as to whether they belonged to the same species.

The growing cells in a chain sometimes turn upon their shorter axis, and then, growing out in the new direction, produce very peculiar figures. In stagnant cultures the cells under high power are mostly very irregular, having in groups the appearance of the bones of the wrist.

Very characteristic are the involution forms produced both in stagnant cultures in media which are not well adapted to the needs of the fungus. Here the forms and sizes are so various that it becomes exceedingly difficult, if not impossible, to tell if certain ones are normal or abnormal. In exceptional cases the threads surround themselves with a thick gelatinous sheath. The protoplasm of the involuted cells generally presents a granular appearance.

If we make a large number of cultures at once we will, in about one case out of five or ten (and if the cultures are made in a decoction of malt, much more frequently), meet with a second fungus, essentially different from the one just described. It occurs chiefly in form of bacilli, but also as leptothrix, bacteria, diplococci and cocci singly, or, as is mostly the case, in long zigzag threads.

The discovery of this fungus, with its different forms of development, affords a very ready explanation of the fact that in a single dentinal tubule we sometimes find a transition from leptothrix to bacilli, from bacilli to bacteria, and from bacteria to cocci, an occurrence which I demonstrated nearly two years ago before the American Dental Society of Europe, before the Gesellschaft fuer Heilkunde, in Berlin, and to various private persons, including some of the most celebrated mycologists in Germany.

Those who maintain, as was done in the British Dental Association, that such cases may not be found, are responsible for their own mistake.

*Macro*-scopically, cultures of this fungus in beef-extract-sugar solution are not easily to be distinguished from cultures of that described above. The fungus collects as a sediment on the bottom of the vessel ; it never forms a skin on the surface of the liquid, and produces but a moderate cloudiness of the same. In most decoctions, however, they present some peculiarities. Sometimes the fungus floats about in the solution in semi-transparent balls, or rises up from the bottom of the vessel like a miniature cloud of smoke, or collects in small patches on the sides of the vessel, while the solution itself remains almost perfectly clear. The cells are motionless, and do not form spores.

In order to discriminate between these two fungi I will designate for the present the one first described by the prefix A, and the one under consideration by the prefix β. In all probability the β fungus also produces lactic acid from sugar. I say in all probability, because, though I have always been able to detect lactic acid in cultures of this fungus, I could not say with absolute certainty that cocci and diplococci of the species *A* were not present.

We have, then, in carious dentine two distinct fungi—one always, the other often, present; the former surely, the latter probably, producing lactic acid from sugar. If these fungi are the direct cause of dental caries, we should be able to produce caries by subjecting sound dentine to their action. This I have accomplished, as described in the March number of this journal (see also April number of DENTAL RECORD).

In one of the figures are seen in outline two tubules of dentine melted together by natural caries, and in another two tubules melted together by artificial caries.

In Figure 4 *a* are likewise two tubules from natural caries, and in Figure 4 *b** two from artificial caries. It is a fact of considerable interest that, though the fungi themselves are perfectly colourless, pieces of dentine subjected to their action become yellowish, light brown, or dark brown, etc., depending upon the medium in which the culture is made, while different pieces of dentine in the same culture do not by any means necessarily acquire the same colour.

The carrying out of this experiment is attended with difficulties, and some may try it and fail. I have failed many times. The necessity of repeatedly changing the solution very much increases the danger from impurities; especially must the saccharymycetes be guarded against. The acidity of the medium caused by the caries fungi renders it very favourable for their development, and when they have once found their way into a culture it might as well be thrown away at once. Again, notwithstanding the presence of the pieces of dentine, the solution sometimes becomes sufficiently acid to impair, if not to destroy, the vitality of the fungus. In this case the dentine becomes softened, but only a slight invasion of the tubules takes place. Then, of course, in the very last stage of caries other fungi, especially leptothrix buccalis, are present in the decomposing dentine, and sometimes produce an appearance in its *superficial* layers, which I have not attempted to reproduce artificially. It is not difficult, by a simple microscopic examination of the fluids of the mouth, as well as of carious dentine, to find forms morphologically identical with those described above.

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* Unfortunately these illustrations are not to hand.

The *A* caries fungus agrees morphologically with the fungus of sour milk as delineated by Pasteur. Later experiments, however, render it probable that the souring of milk is produced by an altogether different fungus, a short, thick *bacterium*, occuring in twos, seldom fours, which may also be found in the human mouth (though probably not deep in carious dentine), and will be considered at another time.

In the case of both fungi the *fermentation* goes on independently of the presence of the oxygen. I have already shown that where only a trace of oxygen is present, in no way comparable with the amount of acid produced, the degree of acidity was as great as where there was free access of air. Whether, however, this *trace* of oxygen is essential to the life of these fungi—*i.e.*, whether without it they would perish from asphyxia—is a question which we will not discuss here.

It has been generally supposed that the production of lactic acid by fermentation from sugar is accompanied by the evolution of carbonic acid; in fact, Fluegge says that no fermentation can go on without the production of carbonic acid. This statement will hardly be borne out by a study of the fermentation produced by the fungi of tooth caries.

A glass vessel of five hundred c. c. capacity was filled with beef-extract-sugar solution, infected with a pure culture of caries fungi and made air-tight with a rubber stopper, carrying an efflux tube for collecting the gas over mercury. After twenty-four hours, during which time 1·76 c. c. acid had been produced, one single gas-bubble was collected, which may have been due to a slight change of temperature, as well as to a veritable gas evolution. The splitting appears therefore to be perfectly smooth, and to take place in accordance with the simple formula—

$$C_6 H_{12} O_6 = 2C_3 H_6 O_3.$$

It presents a marked contrast to the stormy character of the butyric and alcoholic fermentations, in case of which the pressure of the gas evolved is often sufficient to burst the vessels containing the cultures.

There is perhaps at nearly all times a sufficient amount of sugar in the oral cavity to enable the fungi of caries to carry out their characteristic ferment action. It remains, nevertheless, an interesting question, whether they have the power to form sugar out of starch, *i.e.*, whether they have any diastatic action. About thirty cultures in an aqueous solution of beef-extract and starch, and in a solution of starch in sterilized saliva, gave for the most part negative results; in exceptional cases a slight diastatic action appeared to take place, which I am inclined to regard as the result of some impurity in the culture, or an error in the experiment.

On the other hand, the fungi appear without doubt to possess the power to invert, or to render non-fermentable sugars fermentable, since cane sugar, which is not fermentable, and does not reduce alkaline solutions of sulphate of copper, acquires both these properties when subjected to their action. That this result is caused by the action of a ferment produced by the organisms, and which may be separated from them, is, I think, demonstrated by the following experiment: By making a number of cultures at one time in vessels of two hundred to five hundred c.c. capacity, and collecting the sediment which was deposited on the bottom of the vessels, I succeeded in bringing together a considerable quantity of the fungi; this was then treated with ninety per cent. alcohol, filtered and dried in a porcelain vessel, thoroughly rubbed with sand, digested with water at twenty-three degrees Centigrade, and again filtered; the filtrate (which must be clear, and should contain the ferment in solution) was added to a solution of cane sugar, which then showed, in the long tube of a Mitscherlich polariscope, a rotation equal to $5^{\circ}{\cdot}19$. The solution was now allowed to stand four hours at a temperature of thirty-eight degrees Centigrade, after which time it produced a rotation of only $4^{\circ}{\cdot}54$, indicating a decrease of about two-thirds of a degree. The solution also produced a slight reduction of an alkaline solution of sulphate of copper; *i.e.*, a certain portion of the cane sugar had been converted into invert sugar.

In the presence of the fungi the non-fermentable sugar, by the action of the invertine produced by the fungi, takes up one molecule of water and is converted into invert sugar, a mixture of levulose and dextrose, both of which are fermentable.

$$\underset{\text{Cane sugar,}}{C_{12}\,H_{22}\,O_{11}} + H_2\,O = \underset{\text{Levulose,}}{C_6\,H_{12}\,O_6} + \underset{\text{Dextrose.}}{C_6\,H_{12}\,O_6.}$$

We may say, therefore, that the micro-organisms require sugar to produce fermentation, but that it is immaterial which kind of sugar is furnished them. The fermentation is most active between the temperatures of thirty-five and forty degrees Centigrade. Above fifty degrees and below fifteen degrees Centigrade, little or no production of acid takes place.

In addition to these two species of fungi, others of minor importance are occasionally met with in the mouth, and will receive attention at another time,

I would not have any one think that I look upon the above as a thorough consideration of the fungi of tooth caries. To me it appears very imperfect. Nevertheless, I thought it well to present the matter before the Profession in the hope that others might be induced to take it up and help to complete the work thus begun. In the next number I will present the results of experiments relating to the action of various antiseptics, filling materials, etc., upon the fungi under consideration—*Independent Practitioner.*

## DENTITION AS INDICATIVE OF THE AGE OF THE ANIMALS OF THE FARM.

By Prof. G. T. BROWN,
VETERINARY DEPARTMENT OF THE PRIVY COUNCIL.

*From the "Journal of the Royal Agricultural Society of England."*
(*Continued from page* 217.)

### THE TEETH OF THE OX.

IN the front of the mouth of the ox there are eight incisors or cutting teeth in the lower jaw only; an elastic pad of fibrous tissue, covered with mucous membrane, takes the place of teeth in front of the upper jaw. The incisors may be distinguished as centrals, or first pair; middles, or second pair; laterals, or third pair; and corners, or fourth pair; the same terms being equally applicable to the temporary and permanent organs.

Temporary incisor teeth are easily distinguished from permanent, chiefly by their size. The fangs of the temporary incisor teeth are much shorter than those of the permanent incisors, but this fact is not to be recognised until the teeth are removed from the jaw. No question is likely to arise in the mind of the examiner as to the distinction between temporary and permanent organs; in fact, the common term "broad teeth," as applied to the latter, sufficiently indicates their prominent feature.

Molar teeth are named first, second, or third, according to their position. In the temporary set there are three molars on each side of the upper and lower jaw, and in the adult these teeth are changed for permanent organs: while three additional teeth, the fourth, fifth, and sixth in position, all of which are permanent teeth from the first, are added, making the full set of permanent molar teeth six on each side of the upper and lower jaws.

In the mouth of the calf at birth, the temporary teeth, molars, and incisors are all so far advanced that they may be seen in outline under the gum, and commonly the cutting edges of the incisors and a few of the points of the molars are uncovered. The illustration (Fig. 22, see p. 263), shows the state of the incisors at birth.

The advance of the teeth and the receding of the gums proceed very rapidly after birth, and at the age of one month the temporary teeth, viz., eight incisors in the lower jaw, and three molars on each side in the top and bottom jaws, are fully developed. Figs. 23 and 24 show the temporary incisors and molars in the calf of one month old.

Fig. 22.—*Incisors of Calf at birth.*

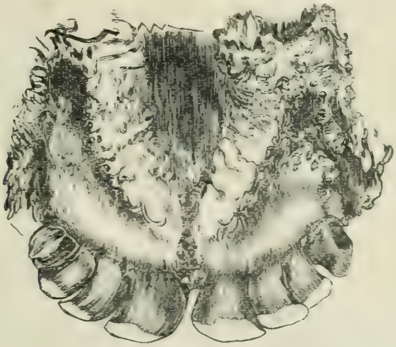


Fig. 23.—*Incisors of Calf at one month.*

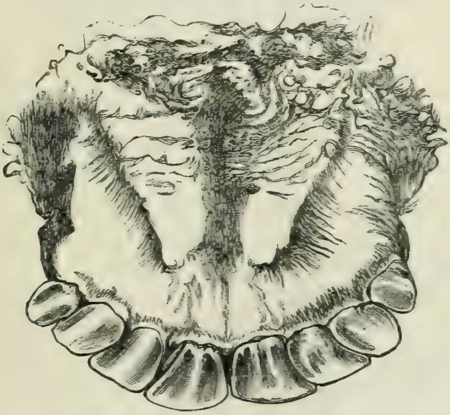
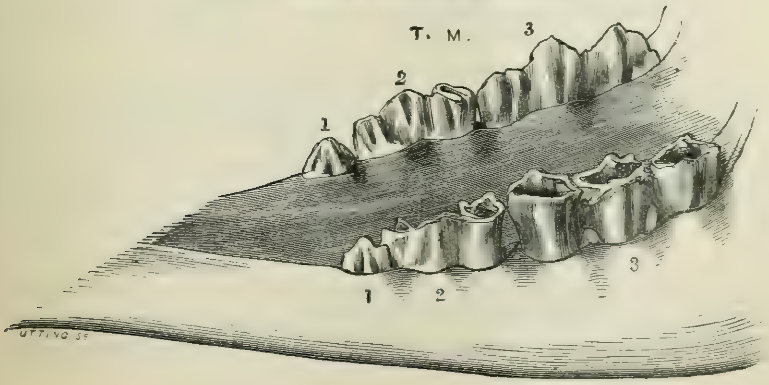
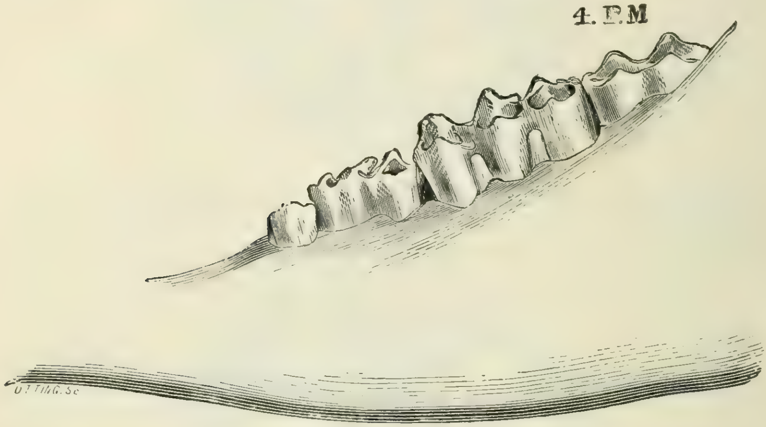


Fig. 24.—*Molars of Calf at one month.*



No accurate opinion of the age of a calf can be formed from the observation of the state of the dentition between the ages of one and six months, when the fourth molar is cut; but during this period the jaws expand, the incisor teeth gradually become less crowded, and the space between the third molar and the angle of the jaw increases as the fourth molar, which is the first permanent tooth, advances to occupy its place, as shown in Fig. 25.

Fig. 25.—*Molars of Calf at six months.*



At the age of six months the fourth molar is well developed, but it is in close contact with the angle of the jaw, and the posterior surface is not quite free from the covering of the gum.

Between six and twelve months old there are no important dental changes, the incisor teeth become worn, and as the jaws increase in size, there is more space left between them; but it is not possible to assert from the states of the incisor teeth whether an animal is under or over the age of one year.

The illustration (Fig. 26, see p. 265), represents the average state of the incisors at the age of one year.

Shortly after one year the fifth molar begins to make its appearance, and at fifteen months it is well up. The appearance which the fifth molar presents at this age is very much like that of the fourth molar at the age of six months. The new tooth is in close contact with the angle of the jaw, and the gum covers the extreme posterior part of its surface. These appearances are shown in the illustration (Fig. 27, see p. 265).

No change occurs in the incisors, excepting that which is caused by the wear of the teeth and the growth of the jaw, until the age of one year and eight or nine months, at which time the two central teeth are oose and the first broad teeth sometimes begin to project through the gum. In very forward animals the central permanent incisors are cut at the age of a year and seven months, but they are never level with the other incisors before one year and ten months, and their perfect development is indicative of the age of two years.

Fig. 26.—*Incisors of Steer at one year.*

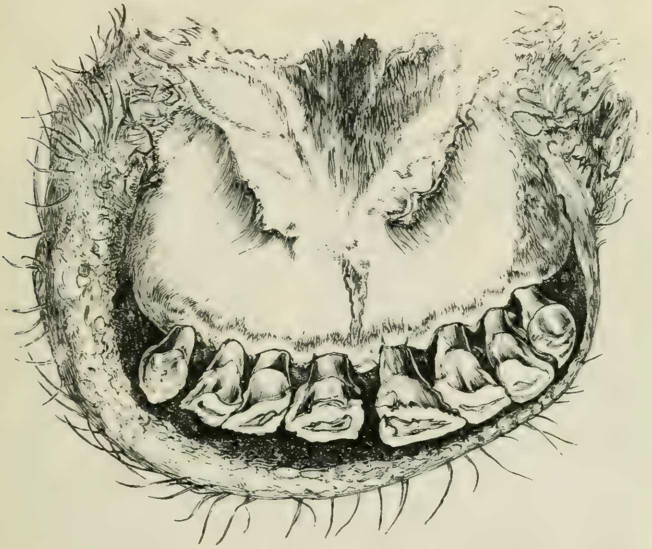
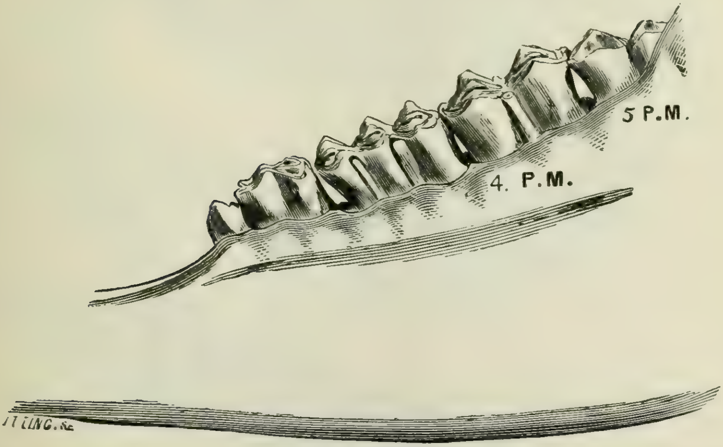


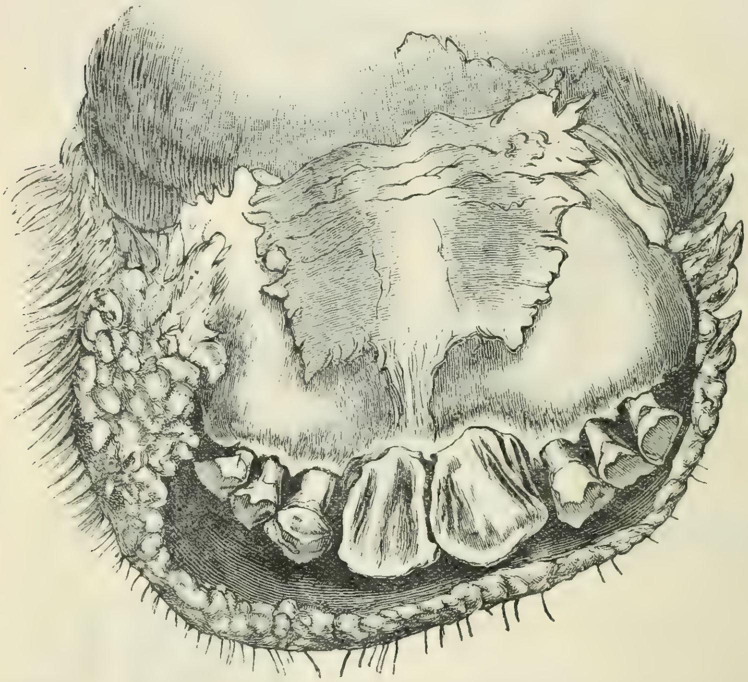
Fig. 27.—*Molars of Steer at fifteen months.*



The next illustration, Fig. 28 (see p. 266), was taken from a Shorthorn heifer at the age of one year and ten months, and may be accepted as indicative of the general appearance of the incisors at that age.

While the first pair of permanent incisors are advancing to take the place of the temporary teeth, the sixth and last permanent molars push their way through the gum, and at the age of two years are in

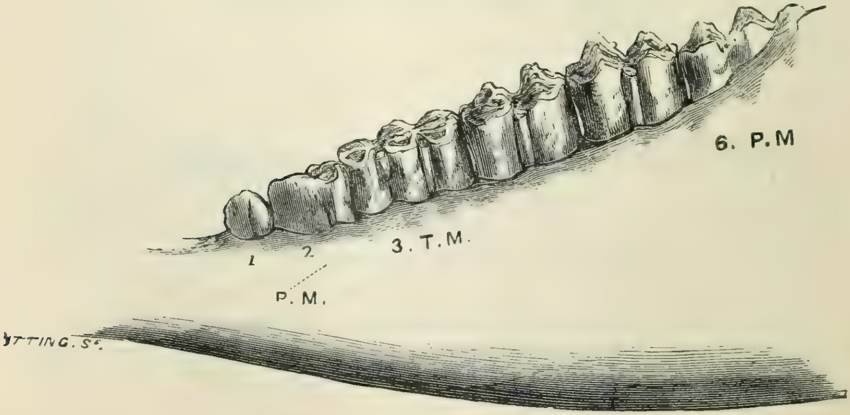
Fig. 28.—*Incisors of Heifer at one year and ten months.*



position. Any error of opinion as to the age which might arise from the premature cutting of the central permanent incisors may be corrected by reference to the state of the molars.

In the next illustration (Fig. 29) the sixth molar is shown in the

Fig. 29.—*Showing the Sixth Molar at two years.*

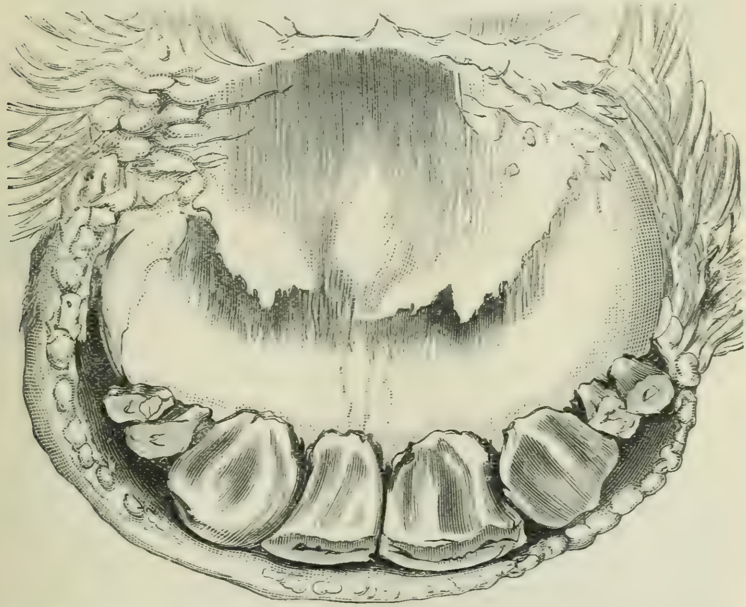


position described, and in the same figure the first and second permanent molars have taken the places of the temporary teeth ; this change, in my own experience, does not usually occur until the animal is a month or two over two years of age.

From two years and three months to two years and six months the second pair of broad teeth, the middle permanent incisors, occupy the place of the corresponding temporary teeth in all the cultivated breeds. Instances of late dentition present themselves from time to time, in which the middle permanent incisors are not cut until the animal is approaching three years old. There is consequently a a possible variation of six months in the time of the appearance of these teeth.

In the illustration (Fig. 30) the ordinary condition of the incisors at two years and six months is shown.

Fig. 30.—*Incisors of Ox at two years and six months.*



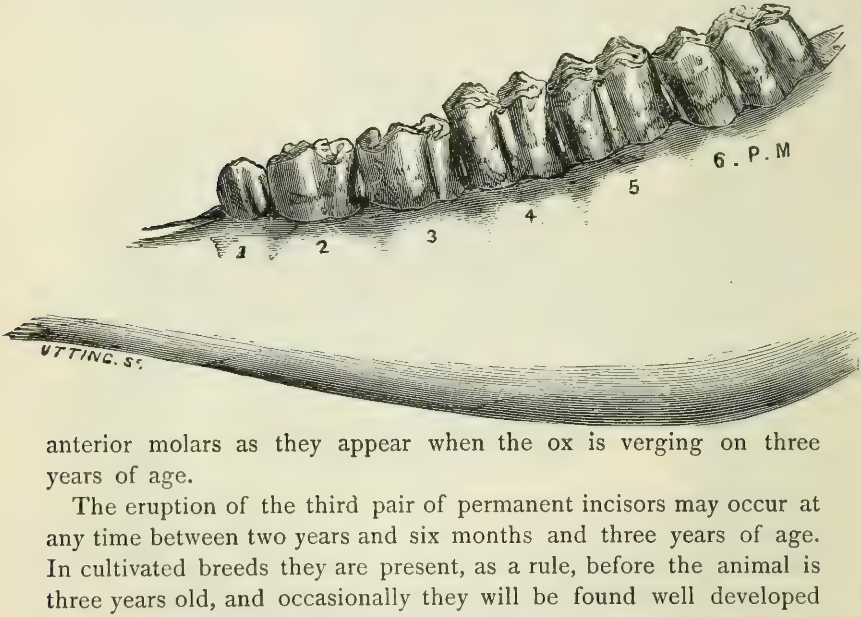
It must be understood, in reference to the appearance of the second pair of broad teeth, that an expert, looking at a mouth which corresponds to the drawing, will conclude that the animal is two years and a half old ; but if he is required to certify that the age is under or above that period, he must proceed to inspect the molar teeth, and take into account the animal's pedigree, its sex, and its general condition of development.

If the animal in question is a bull of one of the cultivated breeds, and has been forced to a state of early maturity, it may be expected that the second pair of permanent incisors will have been cut at two years and four months; and if either of the anterior temporary molars remain in their places, the conclusion that the animal is under two years and a half will be strengthened.

Shortly after the first and second molars are cut, the third makes its appearance; occasionally it appears before the others, and the animal at the age of three years will have the three anterior molars nearly level with the other teeth, but showing no signs of wear.

The following illustration (Fig. 31) exhibits the three recently cut anterior molars as they appear when the ox is verging on three years of age.

Fig. 31.—*Molars of Ox at three years.*

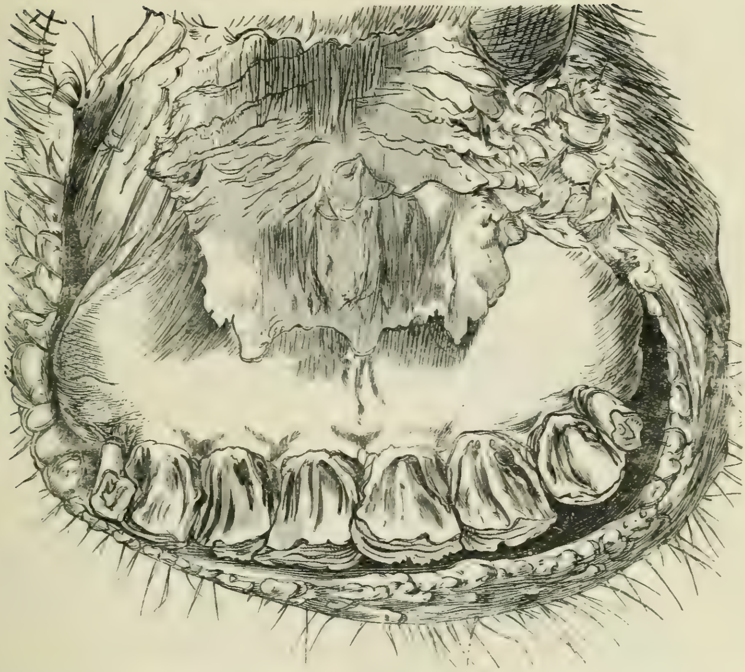


The eruption of the third pair of permanent incisors may occur at any time between two years and six months and three years of age. In cultivated breeds they are present, as a rule, before the animal is three years old, and occasionally they will be found well developed after two years and a half. In fact, the anterior molars afford more reliable evidence of the age between two and a half and three years old than is furnished by the incisors.

The next illustration (Fig. 32, see p. 269), represents the average condition of the teeth in cultivated breeds at three years of age.

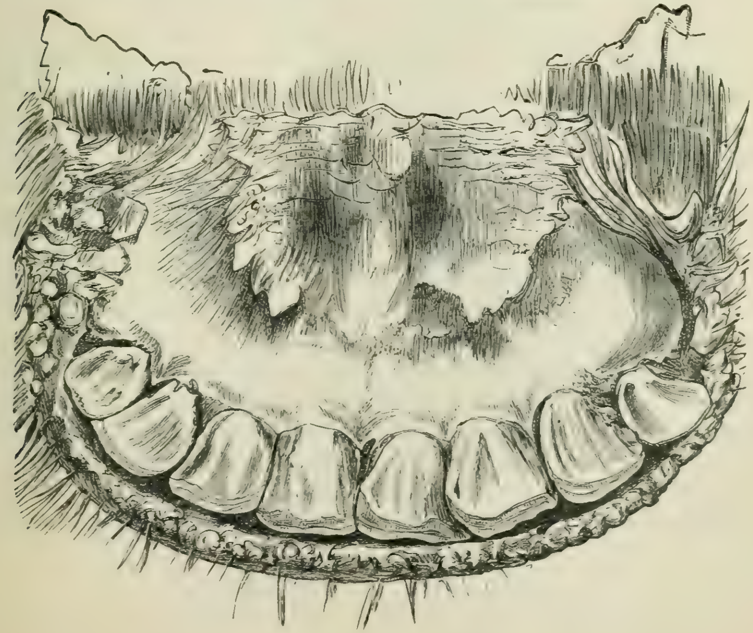
The fourth pair of broad teeth, the corner permanent incisors, are more subject to variation in the time of cutting than the third pair. In well-bred cattle they take the place of the temporary teeth soon after the completion of the third year, but in bulls they are not uncommonly present at two years and ten months old, while in some instances they are not cut until three years and nine months. Very little reliance indeed can be placed on the evidence of the corner incisors, and the examiner is compelled to refer to the molar teeth for the purpose of correcting his opinion.

Fig. 32.—*Incisors of Ox at three years.*



In the succeeding illustration (Fig. 33) the state of the incisor teeth in forward animals at three years and three months is depicted.

Fig. 33.—*Incisors of Ox at three years and three months.*



With the eruption of the corner permanent incisors, the fourth pair of broad teeth, the permanent dentition of the ox is completed; and after this period the changes in the form of the teeth which are due to attrition will assist the examiner in forming an opinion of the age; but no exact estimate can be based on such evidence. The five-year-old ox will show a considerable amount of worn surface in the central, middle, and lateral incisors, and the cutting edge of the corner teeth will be marked by a line of wear; but no one would attempt to determine whether or not an animal were under or above the age of five, and as the years increase, the difficulty of judging the age by the appearance of the teeth is not diminished. The teeth become narrower and more widely separated from each other year by year, but the changes are not sufficiently well marked to enable the examiner to accept them as reliable evidence of age.

(*To be continued.*)

## REPLANTATION AND TRANSPLANTATION OF TEETH.

By R. Theodore Stack, M.D.Dubl., F.R.C.S.;

Doctor in Dental Medicine, Harvard University; Dental Surgeon to the Adelaide Hospital; and Surgeon to the Dental Hospital of Ireland.

*Reprinted from the Transactions of the Academy of Medicine in Ireland.*

*(Continued from page* 223.*)*

The process by which replanted and transplanted teeth are retained in the jaw is a subject of great and practical interest. The methods of union or retention may be divided into three varieties:—

1. Where a truly dead tooth is replanted—that is, a tooth which has been a long time out of the mouth; or else one which, having been recently taken out of the mouth, has undergone such mechanical violence, or been treated by such chemical agents as will have utterly devitalised the periodontal membrane.

2. Where teeth in which the vitality of the periodontal membrane is unimpaired, but from which the pulp has been extracted, are rapidly introduced into the socket.

3. Where teeth are replanted or transplanted without interfering either with the vitality of the periodontal membrane or with that of the pulp.

The method of retention of a tooth whose pulp and investing membrane have alike been bereft of life may be regarded as entirely mechanical. Such teeth are rapidly absorbed by the hostile tissues, which resent their presence, and though at times an armistice may be declared, and the invasion suspended, it seems seldom, if ever, that a lasting peace has ensued. The process of absorption having cut into the body of the root grooves, pits, or deep bays, there is for a time a mechanical retention of such teeth by the dovetailing of the living tissues into the absorbed spaces of the dead root. Eventually, however, such teeth are so far absorbed that they can no longer be retained. Hunter states that he has known such teeth last for some years. M'Leod, in No. 247 of the *British Dental Journal*, describes a case where he had put in an elaborate gold filling in the root, and replanted, the result being absorption of the root in less than a year, when the tooth dropped out and the filling in the root remained, " an upright monolith, sacred to the memory of a downright failure." In this case it would appear that the elaborate operation had induced death of the periodontal membrane before the tooth was replaced. In the museum of the Dental Department of the Harvard University I saw, some seven years ago, a lower molar which had been replanted, and subsequently, after having been worn for some years, removed. Its roots were the subject of extensive absorption. But it had been kept some hours out of the mouth, while a protracted cohesive gold operation was practised on it. Mr. Coleman has related cases of absorption in his own practice, but it is intelligible that here the periodontal membrane was deprived of vitality by the strong carbolic acid into which the tooth was usually dipped. To this class of cases belongs the tooth figured in the work of Mr. Fox ; and also, I believe, some specimens in the museum of the British Odontological Society, referred to by Mr. Charles Tomes at one of that Society's meetings.

Secondly.—The method of retention of a tooth replanted with living periodontal membrane, but with dead pulp and root filled, is simply by a vital union of the separated parts of the alveolodental membrane. Such teeth will probably be retained for a very long time. Possibly after their first introduction there may in most cases be a slight absorption of the dentine by the osteoclasts of the cementum, with, after a time, a deposit of cement in the absorbed spaces ; but as this seems to be a very usual occurrence in cases of slight periodontitis from any cause, no special uneasiness may be manifested in this instance. This temporary absorption will occur equally in the case of the third method of retention—that is, where there is a vital union of the periodontal membrane with the membrane of the socket, and where the pulp chamber also is filled with living material. And here, it would appear, is the proper time to discuss the possibility and the probability of a reunion of the pulp with the tissues outside the tooth. It has been repeatedly stated, up till a recent period, that no one has proved to demonstration that a union of the pulp vessels and nerves with their parent trunks could take place through the small apical foramen. At the meeting of the International Medical Congress, Dr. Joseph Izlai, of Buda Pesth, stated that there were only two museum specimens known bearing on the subject, These, I believe, were made on the lower animals. Some years ago, however, Dr. Isidor Lyons, in London, found the dentine of a replanted tooth very sensitive, which must, I think, prove that in that case the nerves of the pulp had united with their trunks. However, the honour of actually demonstrating this union by observations on replanted and transplanted teeth removed from the human mouth, belongs, I think, to Mr. Arthur Baker, Mr. Abraham, and myself. In a case of great irregularity, where two bicuspids had to be removed—that on one side of the mouth growing horizontally in towards the tongue, and that on the opposite side protruding towards the cheek—I was permitted to transpose the teeth, under nitrous oxide. The teeth fitted into their new sockets nicely, but after a fortnight the tooth that had been transplanted into the right socket was attacked with alveolar abscess. It had apparently got all right after the operation, but I suppose putrefaction of the pulp had then set in, resulting in the necessity of removing the tooth. The other tooth united firmly, however, and kept a good colour. After two months I determined to remove it, but before I did so I drilled in cautiously through the crown. After each few revolutions I asked if I gave any pain, but found I gave none, nor did I give any when the drill entered the surface of the pulp, but at once there was bleeding from the wounded organ. The tooth was then removed and handed to Mr. Abraham for microscopic examination (*vide* Figs. 1 and 2 Microscopic Report). In other cases that have come under Mr. Baker's and my notice, where a tooth which had ultimately to be removed for irregularity was replanted for a short period, the microscopic examination has shown evidence of life in the pulp. In all six teeth have been examined in this way, in four of which were found signs of life, while in two—viz., one that has already been mentioned and another—were found bacteria or other evidences of putrefaction.

Mr. Abraham will, doubtless, point out in the first case I have mentioned that the microscopic examination, in addition to its interest with reference to union of the pulp or new formation into the pulp cavity, exhibits also evidence of that absorption of dentine to which I have alluded in discussing the second method of retention. It may fairly be inferred that this absorption is temporary in character, and the very fact that it occurs in this case with a vital pulp demonstrates that this process is not due to a lowering in vital tone of the dentine through death of the pulp, and that most probably its cause will be found in the slight periodontitis that follows the operation.

And now let us face boldly this bugbear of absorption with which

Mr. Charles Tomes and others threaten us, even after an operation apparently successful in other respects has lasted for a number of years. As I have above stated, Mr. Tomes, and M'Leod, and others, have exhibited specimens of replanted teeth with absorbed roots, but they do not appear to have drawn a just distinction between the varieties I have mentioned—viz., those in which the membrane of the tooth retains its vitality and those in which its vitality is lost. The course of events which usually, if not always, attends the replantation of a tooth pulpless and membraneless, has on this account been predicted by these observers as likely to occur in the case of a tooth with living periodontal membrane. Unless this explanation of their sinister augury be accepted it appears to me that they are placed in the following dilemma—either absorption is due to permanent injury of the alveolodental membrane by the wrench of extraction, or else it is due to death of the pulp. But it must be admitted that the greater number of sound teeth accidentally knocked out and replaced by the patients themselves become perfectly firmly implanted for many years (*vide* many cases in accompanying Table). So much for the theory of the wrench and tearing of the alveolodental membrane being the cause of this rapid absorption of the root; and the second theory that this absorption is a sequence of death of the pulp is quite as untenable from this one fact—that teeth well pivoted, in which case the pulp is of course always exterminated, will frequently remain for twenty, twenty-five, thirty, or even nearly forty years. We need not go out of Dublin for instances of this in the practices of Mr. Robert Moore or Mr. Daniel Corbett. The latter gentleman has presented to the Museum of the Dental Hospital of Ireland a root which was removed from the mouth, after retaining the artificial crown that was attached to it for some thirty-five years. The conclusion I would draw from these considerations is—that provided due precaution is taken to retain the vitality of the periodontal membrane while the tooth about to be replanted is out of the mouth, there need be little apprehension of this unfavourable result attending the replantation.

Apart from its direct therapeutic value, the operation of replantation is a guide to the allied operation of transplantation. It may be fairly argued that a sound tooth reintroduced into its own healthy socket a short time after its first removal, will have conditions, both as to reunion of pulp and periodontal membrane, as favourable as any that can be attained by the scion tooth and its new surroundings in the operation of transplantation. If in the case of rapidly replanted teeth a large number of cases failed to attain union through the periodontal membrane, we might indeed consider it doubtful if any case of transplantation would succeed. Rapidly replanted teeth, as has been already stated in this Paper, seldom fail to attain this union, but the regaining of union of the pulp or of new vitality in the pulp chamber is a different matter. Many of these rapidly replanted teeth fail in this respect. Some time after the accident many of these teeth will assume the dull colour which indicates a dead pulp. In the list of cases to be found in the Table it will be observed that of six cases of rapid replantation, though all attained good periodontal union, only four regained life in the pulp chamber. The remaining two cases were found after some interval with dead pulps. In one case alveolar abscess had actually set in (*vide* Case I.), and I think there is little doubt that this condition would sooner or later have supervened in the second case (Case VII.). It is worthy of remark, too, that in this latter case the tooth was an immature bicuspid with one root and a large apical foramen. This immaturity, you will remember, was a condition selected by Hunter in his successful experiment; yet in this case the tooth rapidly lost its translucency, and the pulp when examined was found decomposed (*vide* Microscopical Report). The union of the periodontal surroundings was, however, perfect, and the second extraction as difficult as the previous one of three months earlier date.

In this case, then, the replanted tooth would have become good and useful if the pulp chamber and canal had been filled. The observations in our Table are too few to furnish statistics on which we may rely, but as far as they go they indicate in cases of rapid replantation death of the pulp in 33 per cent. of their number. We may assume that this would occur oftener in cases of transplantation; and I throw out now as a consideration worth weighing, and which seems not to have been contemplated by previous writers, the following question:—In cases of transplantation, is it advisable to eradicate the pulp and fill the root canal of the scion tooth? As a help towards furnishing an answer to this question, I may again refer to our Table. Of five cases of transplantation (two of which, viz., one and two, ought rather to be called transposition), four have apparently succeeded, and one, a case of transposing a healthy tooth to a healthy socket, has failed evidently through death of the contents of the pulp chamber. Of the four that have succeeded, two have been cases where healthy teeth have been introduced into healthy sockets. In the other two cases the sockets have been the seat of long-continued abscess and fistula, but the scion teeth were healthy. Of these two cases—in one, the scion tooth, an immature bicuspid has before introduction had its pulp chamber and canal antiseptically filled—in the other case the scion tooth was mature and was not thus treated. This is a case of Mr. A. W. Baker's, and is going on well, but perhaps has been too lately performed to justify a too confident anticipation of success. This case has many interesting features, but as I hope we shall at some future time hear Mr. Baker on this subject, when our observations are more numerous and our judgments more mature, I shall refrain from further comment. Mr. Atkinson, at the recent meeting of the International Medical Congress, objected to the discussion of this subject of replantation, as there had not yet been sufficient observations made about it; but I feel, before this Academy, that we are not all to wait till we are satisfied that we can make no further advance previous to bringing before you even our speculations or theories, if you will, for correction and improvement.

To conclude, I beg to observe that the motive for transplantation in this year of grace 1883 is very different from what it was a century ago in John Hunter's time. Then the immoral practice obtained of wrenching from the jaw of the indigent and helpless a tooth for my fine lady for the price of a meal. Mr. Coleman, in a Paper read before the Odontological Society of Great Britain, introduced a humorous caricature of this practice by Rowlandson, some idea of which may be given by the illustration at page 100 of the seventh volume of the Society's Transactions.

Now-a-days it will be chiefly for the poor that this operation will be practised, and it is not unreasonable to hope that when the conditions of success are more fully understood, a great boon may be bestowed on those who cannot obtain the aid of artificial dentures.

*(To be concluded with Microscopical Report, Illustrations, and Tables of Cases.)*

## NATIONAL DENTAL HOSPITAL AND COLLEGE.

THE Annual Distribution of Prizes to the successful students of the past year took place at the Beethoven Rooms, Harley Street, on the evening of the 19th ult., Dr. W. H. BROADBENT presiding.

The proceedings commenced by the Dean reading the following Report:—

The several events that have occurred in connection with our School during the past year have all been of minor importance. The only change that has taken place in the lecturing staff has been the retirement of Mr. Oakley Coles from the lectureship on the subject of "Deformities of the Mouth." This occasion for regret recalls once again our indebtedness to Mr. Coles for his many and highly-valued services.

Since my last Report four of our students have taken Dental qualifications, two having passed the Royal College of Surgeons of England. One student having the Membership of that College, also took the Dental License of the Royal College of Surgeons of Edinburgh, and one that of the Irish College.

The most distinguished student of the year is Mr. F. Wright, he having been awarded the Rymer Gold Medal for General Proficiency, the Prize Medal for Dental Mechanics, for Dental Anatomy, for Operative Dental Surgery, and the Prize for the Best Piece of Mechanical Work. Last year Mr. Wright also received the Prize Medal for Metallurgy. Though Mr. Wright has thus been so very successful, it will not be a breach of confidence to say that his nearest competitor in each of the several subjects was not far behind him—each race was a close one. Mr. Batten has been awarded the Prize Medal for Dental Surgery; and a Certificate of Honour is to be presented to Mr. Wrighton, Mr. Browne, Mr. Carter, Mr. Poole, and Mr. Elliott.

Much pleasure was felt when Mr. Alfred Coleman consented to distribute the prizes this evening, but we were greatly disappointed when on Friday last Mr. Coleman wrote that, owing to suffering from an attack of acute bronchitis, he would be precluded from fulfilling his engagement. Our position was represented to Dr. Broadbent, one of the Consulting Physicians to the Hospital, and the readiness and good grace with which he undertook to preside on this occasion at once relieved our anxiety, and his kindness is highly appreciated by the staff.

The prizes having been distributed, Dr. BROADBENT delivered the following address:—

It is a very awkward thing to have to begin my address this evening with an explanation or an apology.

All of you are aware, from what the Dean has stated, that Mr. Coleman should have been in the position I now occupy, but is prevented by illness. I feel sure that no one, not even those gentlemen who expected to receive their rewards from his hands, more deeply regret his absence than I do.

With regard to what our friend, Mr. Gaddes, has stated, namely, that I readily consented to preside at this meeting I really must correct him, as I have had to do on aformer occasion. I acceded to the request conveyed by him most reluctantly, not, however, from unwillingness to take the position I am placed in this evening, but from a feeling of unfitness. If I displayed any readiness in the matter it was only the kind of readiness which we all display when we are nervous, which makes us take a plunge to get the duty over with the utmost possible speed. Still, were it not for my sense of unfitness, I should consider it a great pleasure to preside; and, as it is, I esteem it an honour to have been invited. A man must be very cold or cynical who could not take part, in some degree, in the pleasure and satisfaction of the young men who now receive the rewards of their successful toil during the past year.

I scarcely know whether I need offer any further congratulation to Mr. J. Wright on his success, for he has had this evening so many congratulations, that I think more will, perhaps, be unnecessary on my part. One may have even too much evidence of appreciation of success; and were I to venture to recommend him to bear his honours meekly, he might consider it to be a piece of unnecessary advice on my part. If Mr. Wright is to be spoiled by success, then, he has had enough to ruin him for life; but if he be not the man to be spoiled, my admonitions would be wasted on him.

With regard to those gentlemen who have not been quite so successful, shall I commiserate them? I think not. If one is to be beaten at all, it is much better to be beaten by one of these phenomenal individuals whom we occasionally see amongst us, and who simply carry everything before them. In such a defeat, gentlemen, there is no disgrace or loss. But the race is not yet over; it is quite true that Mr. Wright has taken the first fence with a long lead, but even if he come in an easy winner there is at the same time success for all of you. There are qualities which are not to be tested by examinations; qualities of heart and mind, which will be brought out in your struggle for success.

I do not know whether I am expected to address you as students of the National Dental College. If so, I have not sufficient knowledge of your speciality to warrant my doing so, and even if I did possess such knowledge, I think I should not make use of it this evening, for it is not as members of any particular calling or profession that you come nearest to us in interest, but it is from the fact that you are just entering upon your career.

You are desirous, of course, all of you, of making an honourable and respectable position. You are desirous, all of you, of doing even more than that, namely, of obtaining distinction in the profession you have chosen. All of you are, I trust, animated by a just and warm ambition, which is a perfectly right condition. It is personal ambition which is really the motive force of our progress. But it must be employed under proper discipline and directly to proper objects. It should be the aim of all of you that the profession you have chosen may be the better for the fact that you are members of it. Your endeavours should not be merely to advance yourself in your calling, but also to make that calling nobler from your character and endeavours. (Cheers.)

Again, in seeking the advancement in your daily life, let it never be at the sacrifice of self-respect. There should be nothing, and there will not, I trust, be anything sordid or mean in your endeavours to succeed; but may your professional life be actuated by high motives. Envy no man his legitimate success, still less success of the kind which we see exhibited by a class of men who always hang upon the skirts of any great profession, which is a mere matter of pounds, shillings and pence. Even in this respect it is always less than it appears, and is only so much veneer upon the surface, and whatever it may look like is to the truly honourable man not worth having at any price. (Cheers.)

I trust, then, that all of you entering this profession will so use and direct your personal ambitions and endeavours that the result may be not only your own advancement, but also the good of your profession and of the public who seek your aid.

Allow me just to say one word more, and that is never look for immediate results. It is short sighted in more senses than one to be looking for immediate success and reward; if you do it will simply lead to superficial work which, in the long run, does not answer. What is required is a steady perseverance, well and evenly sustained. (Cheers.)

I think now that the time has arrived, this evening, for us to have something more pleasant than speeches. I have only, therefore, in conclusion, to congratulate the students on the results of their year's work, and the staff upon the kind of men they are turning out, and to express a hope that prosperity may continue to attend in increasing measure the efforts of the staff of this National Dental College.

Mr. J. Stocken, in proposing a vote of thanks to the chairman said:—

When they remembered the small beginning that was made in 1856, in Cavendish Square, and observed, at the present time, to what height of success this hospital and school had reached, he thought that all interested could not but feel proud. (Cheers.) He felt that they were greatly indebted to Dr. Broadbent for taking the chair that evening. It was not every one would undertake such a position at so short a notice. They all regretted the illness of their friend, Mr. Coleman, and he (Mr. Stocken), would have been pleased to have seen that gentleman amongst them that evening, for he liked it to be seen that there was a friendly feeling and the non-existence of animosity between their Hospital and the Dental Hospital of London, which institution Mr. Coleman would, to a certain extent, have represented.

With regard to what their worthy chairman had said, he thought if the students would only take the advice given, success would not be the only result, but satisfaction as well.

If success was not obtained conscientiously it was not worth having; and if a man in a profession, such as theirs, performed his work in a satisfactory manner, there was in the end something more than the monetary consideration which, if continued, would ultimately lead to prosperity. In conclusion he would again thank their worthy chairman for his kindness in presiding over them during the evening.

Dr. Broadbent having replied, an excellent concert brought the proceedings to a close.

## AMERICAN DENTAL SOCIETY OF EUROPE.

The Annual Meeting of the American Dental Society of Europe for 1884 will be held at Vevey, Switzerland, beginning on Tuesday, 26th of August, at 11 o'clock.

Members of the Profession are cordially invited.

The following Papers have up to the present been announced :—

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| *System in Dental Operations* . . | A. A. Blount, Geneva. |
| *Experiments with Varions Amalgams,* | W. St. George Elliott, London. |
| *Porcelain Crowns* . . . . . | ,, ,, ,, ,, |
| *Notes on Recent Additions to the Dental Pharmacopœia,* | George Cunningham, Cambridge. |
| *Filling Materials, their Combination and Therapeutic Action,* | A. H. Chamberlain, Rome. |
| *Methods Employed in the Study af Dental Caries, with Demonstrations* . . . . . | W. D. Miller, Berlin. |
| *Observations on the Resection of the Dental Pulp,* | George Fay, Brussels. |
| *General Advice of the Dentist to the Public, and especially to Mothers, on the Development of the Teeth and their Preservation* . . . . . | E. De Trey, Vevey. |
| *Artificial Crowns and Bridgework,* | J. C. Spaulding, Breslau. |

Papers will also be presented by C. M. Wright, Cincinnati, and W. C. Barrett, Buffalo. Reports will be presented on the latest improvements in Mechanical Dentistry (W. L. Coffin); in Operative Dentistry (W. St. G. Elliott); and on recent Discoveries in Dental Histology and Pathology (W. D. Miller).

Clinics, Exhibition of Apparatus, Microscopical Demonstrations, etc., will take place every afternoon during the Session. Dr. W. D. Miller is President and Chairman of Executive Committee.

## JOURNALISTIC SUMMARY.

### DENTAL COSMOS *(May, PHILADELPHIA).*

"Embryology, with Special Reference to the Development of the Teeth and Contiguous Parts," by J. L. Williams. This portion of the article, continued from the two previous numbers, is illustrated by a beautiful chromo-lithograph of a section from the inferior maxilla of a kitten at birth, showing the several developmental organs of a tooth. There are also two woodcuts showing the odontoblasts and their relation to dentine and other pulp tissues. The author says:—"The entire protoplasmic contents of the reticulum of the enamel organ are heavily impregnated with lime-salts, which are conveyed from the capillary vessels surrounding the tooth-sac to the ameloblasts for the formation of the enamel. Concerning the exact *modus operandi* of the formation of enamel, as well as other hard tissues on which we have a basis-substance with calcific infiltration, we have yet much to learn." Whether the formation of enamel results from calcific infiltration of the ameloblasts (enamel cells), or is affected by a process of secretion and deposition (to this latter view he inclines), the enamel prisms undoubtedly receive their form from the peculiar arrangements of the ameloblasts. He considers the odontoblasts are probably of the nature of multipolar ganglion cells; that the dental fibrilæ are prolongations of the odontoblasts, from some of which cells but a single fibre could be traced, while from others two, and sometimes three fibres were seen to originate. Delicate fibres are also seen to project from the ends of the cells lying next to the pulp tissues. These fibres are in direct connection with the reticulum of the pulp, and the nerve fibres can be seen to send terminal fibrilæ into this reticulum with which the roots of the odontoblasts are in immediate contact. The odontoblasts, while composed of what is essentially neural matter, are probably at the same time the elementary agents in secreting the material for the formation and continued integrity of the dentine. With regard to Nasmyth's membrane, he says:—"Ameloblasts finally become almost obliterated, and, together with the outer layer of small flat cells which lie directly upon the ameloblasts, are probably calcified to form Nasmyth's membrane." The formation of cementum and the development of the surrounding osseous tissues will be the subjects of the next Paper.

Among "INCIDENTS OF OFFICE PRACTICE" mentioned at the New York Odontological Society in February last, Dr. Abbot mentioned that a patient came to him complaining of the noise made by the articulation of her set of artificial teeth. He ascertained the points of contact by means of articulating paper, and drilled six or seven cavities in the crowns of the bicuspids and molars, and filled three or four of them with gutta-percha, and the other three or four with gold. The noise immediately ceased, and the patient was very much delighted.

Dr. Kingsley says, that if he be making a set of teeth for a patient who has found this difficulty with a former set, he pulls the molars out of the flask, if he is using vulcanite or celluloid, and lets the material into their places; the patient then masticates on vulcanite and there is no clatter at all.

"SOME THOUGHTS ON ANTISEPTIC TREATMENT," was the subject of a Paper read by Dr. J. N. Howe; and Professor T. Fillebrown read a Paper on "Gold as a Filling Material, and its Manipulation;" upon which considerable discussion followed.

### THE INDEPENDENT PRACTITIONER *(May, NEW YORK).*

"FERMENTATION in the human mouth, its relation to caries of the teeth," by Dr. W. D. Miller. This Paper is reproduced on page 257.

"DENTAL MECHANISM," by Dr. A. Retter. Continuous gum, gold, aluminium, Rees's metal, and celluloid, each have their good qualities, but rubber, too, has its many advantages with fewer disadvantages of almost any other basis. Perhaps there would be but few Dentists who would not more willingly acknowledge the excellency of rubber were it not for its non-conducting property which, it is argued, is the cause of sore mouths. Rubber only too often receives the blame which should be laid, in many instances, to other causes; the writer having met with sore mouths under gold, platinum, and continuous gum.

"DENTAL HYGIENE, The Best varieties of Food to Develop and Sustain Tooth Structure," by S. B. Palmer, M.D.S. Our legislators have wisely passed a bill for teaching hygiene in schools, and he trusts Dental Hygiene will not be overlooked in the text-books to be introduced. The Paper is concluded with some general instructions.

"THE D.D.S. IN EUROPE," by Dr. J. L. Quincy. A few years ago it was a fact recognized by all educated Europeans, that the title of D.D.S. was an evidence of superior ability. What is the condition of to-day? Instead of the D.D.S. being a passport to every social circle, it has day by day become more and more marked by suspicion. And this, in the writer's opinion, has been directly brought about by the loose way in which American colleges grant their diplomas. Some of them are either quite reckless as to whom they confer degrees upon, or are altogether too credulous for men in their position. He can point out many instances of European graduates of American Dental colleges who know scarce a word of English. How could such men understandingly attend lectures? The system of teaching is quite satisfactory, what is required is, more strict examinations and the placing of all students upon the same level. Europeans should be obliged to pass the same examination as do native Americans. It is not the Buchanan or Morrison bogus diploma factories that are doing the most injury; but it is the reckless manner in which supposed-to-be-reputable colleges are conferring degrees upon Europeans that is demoralizing American Dentistry abroad.

"Capillary Dentures," by Dr. C. H. Land. Capillary attraction is the force that causes the denture to adhere. When two plain surfaces are placed close to each other, and brought in contact with any fluid substance, the force of capillary attraction is manifested ; the moisture enters into and between the surfaces, going against its own gravity, causing the plates to unite with considerable force. And although the atmosphere has a tendency to occupy space with a force equal to 15lbs. to the square inch, the moisture has driven it out and occupied the space originally held by it. At this juncture we have arrived at a state of equilibrium, having no air space, no vacuum, consequently no pressure. If these latter terms were left entirely out of consideration it would be much better for both the operator and his patient; therefore, if we pay more attention to augmenting the moist condition which is the real adapting medium, and a proper system of relief for the ridge portions of the mouth, such expressions as air chamber, air pressure, and vacuum, will be meaningless.

"Is Dental Work Expensive?" by Dr. D. R. Stubblefield. Everybody has a right to demand good Dental work as a fair return for value received ; but when good Dental work has been given, is the price set upon it by a fair-minded Dentist to be considered exorbitant ?—that is the question. Price is regulated, as economists say, by demand and supply, and the writer proceeds to consider these two aspects of the question.

"Incidents of Practice," by Dr. C. E. Francis. This is a short account of disease of the antrum.

### DENTAL REGISTER *(May, CINCINNATI.)*

"The Debts We Owe," by Dr. Robinson. The first great untruth that prevails to an alarming extent is, tooth extraction. Tooth extraction must pass away with Calomel and the lancet—even *Hydragyrum-cum-creta* is fast being pushed aside for milder forms of medicine. There are twenty millions of teeth extracted annually in the United States, of this number fifteen millions are sacrificed to the juggernaut of Nitrous Oxide, Chloroform, and Ether. Instead of saying the *folly* of extracting teeth, we should say the *crime* of extracting teeth. It is harder to unlearn a thing than to imbibe a wrong principle. Tooth extraction is inherited from the fathers, they never dreamed of a more excellent way ; it belongs to the days of barbarism when everything that offended was destroyed. To extract good teeth because they are painful, or because it is more convenient to insert a full denture than to make a partial one, is murder in the first degree, it is a capital offence against Society. We repeat what we have said so many times before, that the motto of the Dentist should be, "no teeth extracted."

The second great debt we owe is to rid the Profession and the world of the idea that teeth can be permanently saved by filling with amalgam. I do not believe there has ever been a successful operation with an amalgam filling on an approximal surface running below the gum.

An Address to the Graduates of the Ohio Dental College, by Dr. F. A. Hunter.

There are many different ways of working up a Dental Practice, but the easiest, speediest, most certain and satisfactory is by advertising—not in the public prints, by handbills, or by joining church—but by advertising the fact, unostentatiously, that you are a gentleman, and by letting your work advertise your ability.

"OPERATIVE DENTISTRY," by Dr. J. M. Hurtt. There are few operations performed on the teeth that do not require the use of medicines, either within or about them. Medicine is often necessary in Operative Dentistry, and the Profession seems slow to see that hundreds of teeth are saved by therapeusis which were formerly consigned to the forceps. The Dental Student who stops short of a medical education may ever regret this lack in Operative Dentistry; and the preceptor who advises simply a course in Dentistry may not have read the signs of the times.

"CAUSE AND TREATMENT OF FACIAL NEURALGIA," by Mrs. W. M. S., D.D.S. The writer mentions certain Dental diseases among the local causes of facial neuralgia, and with regard to the treatment, divides it as operative and curative.

"A NEW OBSERVATION IN DENTINAL STRUCTURE," by William C. Britton. The writer believes that the teeth are possessed of a true laminated structure, these laminæ being superimposed upon one another, concentric to the axis of the teeth from the pulp to the periphery. This lamination is a persistent and normal feature of tooth structure.

### ITEMS OF INTEREST *(May, PHILADELPHIA).*

"An Interesting Case of the NON-ERUPTION OF TEETH." This was a young lady about 26 years of age who had a full upper and lower set of artificial teeth. She had never had a first nor a second dentition—not a single tooth ever having made its appearance in either jaw. She having been suffering acute pain in the head and both jaws for four months, chloroform was administered, and the bony sockets of the impacted teeth were opened by means of the burring engine; the teeth were found in a horizontal position, upside down, one tooth joined to another by exostosis, and the roots of others partly absorbed. All the teeth in the upper and lower jaws were removed; one of the eye teeth was found occupying a horizontal position towards the middle of the palate. The operation lasted about two hours, and since the operation the patient has been entirely free from pain.

"OUR RELATION TO MEDICINE," by Dr. T. W. Brophy. A great work to be accomplished by our Profession is to prevent, if possible, caries of the teeth. If, however, we fail in this, our next duty is to arrest it; this can only be accomplished by the aid of a knowledge of chemistry and therapeutics, and a complete control of the patient (thus enabling the practitioner to prevent, or correct, a contracted arch and crowded teeth); a strict observance of the laws of hygiene, and last, but not least, the careful training and skilful hand of an honest, conscientious Dentist.

## THE SOUTHERN DENTAL JOURNAL *(May, ATALANTA).*

"THE RUBBER QUESTION." This section of the article deals with the effects of vulcanized rubber upon the mucous membranes and the soft tissues of the mouth and throat, the abnormal nature of the secretions and their effect upon the bony structures, and upon general health. The article concludes with an epitome of opinions upon the subject.

"FILLINGS FOR DECIDUOUS TEETH," by Dr. A. H. Best. Having considered the disadvantages of gutta-percha, plastic cements, gold and tin as filling materials for temporary teeth, the writer is particularly inclined to the opinion that, all things being considered, there is nothing equal to a good amalgam as a filling for deciduous teeth. By the term good amalgam he means any article of that character easily manipulable, moderately rapid in solidification, not liable to leakage, and exercising that salutary influence upon the dentine which he has already referred to.

A remarkable case of "CRANEAL SURGERY" is recorded by W. B. Woodall, D.D.S. The patient during an epileptic seizure had fallen upon the glowing coal in the fireplace. A large portion of the scalp afterwards sloughed, exposing the frontal, parietal, a portion of each temporal, and a portion of the occipital bone. The outer table of these bones was exfoliated, and removed in small portions by means of a hand saw-file. The outer aspect of the inner table is now completely covered by a protecting membrane, though the frontal sinuses are still exposed. The several pieces of the skull have been joined together, and to see a living man holding his own skull in his hand would be interesting to any one, especially to surgeons.

## THE OHIO STATE JOURNAL OF DENTAL SCIENCE
*(May, TOLEDO).*

"Special Influences Encouraging SEPTIC DISCHARGE from ALVEOLAR-DENTAL TISSUES," by Dr. Frank Brewer. This is the third article upon the subject.

"PHOSPHATE OF LIME AND THE TEETH," by Professor C. M.

Wright. An epitome of this Paper, which also appeared in the April number of the *Dental Register*, is given on page 236 of the DENTAL RECORD.

### NEW ENGLAND JOURNAL OF DENTISTRY *(May, SPRINGFIELD).*

"A HISTORY OF DENTISTRY," by Dr. George H. Perine. This section of the article deals with the early practitioners in America, and it is mentioned that prior to the War of Independence there was, so far as we can learn, but one Dentist in the American Colonies, and he was an Englishman by the name of Wooffindale. He was born at Sheffield, England, in 1742. The subject is to be continued.

"The Method of Examining Fungi and the Means Employed for Preventing their Formation," is a translation occupying two pages from the *Aerztliches Intelligenzblatt*. It is to be continued.

### THE ODONTOGRAPHIC JOURNAL *(April, ROCHESTER).*

"THE BONE TISSUE," by Dr. Karl Heiztman. This article deals with the development of bone from fibrous connective tissue, and the growth and retrogression of bone.

"A DENTAL ENCYCLOPÆDIA." There is sketched a scheme of the work and plan of procedure.

### THE DENTAL ADVERTISER *(April, BUFFALO).*

"THE TREATMENT OF ACUTE ALVEOLAR ABSCESS BY SULPHURET OF CALCIUM," by Dr. George B. Snow. The writer quotes largely from "Phillips's Therapeutics," and "Ringer's Therapeutics," and thinks that there is ample ground for believing that the sulphurets may prove very beneficial in the treatment of alveolar abscess; and, judging from the extracts and his own experience, he feels warranted in warmly recommending the Sulphuret (Sulphide) of Calcium to the attention of Dentists.

The other articles are selections from contemporary publications.

### THE DENTAL PRACTITIONER. *(April, PHILADELPHIA.)*

"A DAY'S PRACTICE," by Dr. J. S. Fogg. This is a notice of an article upon the subject which recently appeared in the *Independent Practitioner*. The writer gives some general instructions with regard to taking plaster impressions, preparing the model, striking up plate, the adjustment of clasps, and the attachment of teeth.

"TREATING AND FILLING PULPLESS TEETH," by Dr. J. R. C. Ward. This was the subject of a Paper read before the Odontographic Society of Pennsylvania in March last, and the discussion which followed is also here given.

# Editorial.

## THE VIVISECTION LAW.

The experimental achievements of M. Pasteur are now widely known, and not the least important are his recent results in obtaining attenuation of the virus of rabies, and, therefore, of protecting human beings from hydrophobia. The French Minister of Public Instruction has granted him a Commission of Investigation, consisting of the ablest physiologists and pathologists in France, and a large domain belonging to the State has been placed at his disposal. How differently are subjects of that kind treated in this country! Three years ago the present Home Secretary refused a license to Prof. Fraser; and several other eminent men, including Prof. Lister, Prof. Greenfield, and Dr. Lauder Brunton, have been precluded carrying on most important investigations. The 5th of this month is the date fixed for the second reading in the House of Commons of the "Vivisection Prohibition Bill," notwithstanding the existing law and its administration, of which a very distinguished worker writes:—"I have not been engaged in other investigations for the simple reason that, with the present restrictions, and the difficulty of obtaining a license, I regard it as almost hopeless to attempt any useful work of the kind in this country."

Most of the great truths of Physiology, of Pathology, and of Therapeutics, have been made known to us by experiment; and the experiments by which that knowledge has been obtained, have been performed upon either human beings or the lower animals. If we were now conversant with the whole details of those sciences, or even possessors of sufficient information concerning all diseases, or the action of all remedies, then should the aggregate of the pangs and sufferings from disease of the human family less resemble the enduring torture of a terrestrial pandemonium. But our knowledge thereof is not replete. This will every practitioner, Medical or Dental, admit; and the statement is in keeping with the relativity of all knowledge. We are not, therefore, to stand still, or we retrograde in the march of nations. The more we know the greater is the region of the undiscovered—of the unknown. This is true alike in medicine and its branches, as in physics and the sciences generally. By our vivisection laws is scientific investigation, as regards physiology, pathology, and therapeutics, blasted in England. The glory of discovery will pass from us and rise where there is less restriction; and the laboratories, public and private, of our eminent continental rivals will become still more brilliant with the medallions of new data upon their door posts.

There is urgent need for further experimental investigation in Dental matters. It were better, certainly more humane, that such inquiry be made upon the lower animals than upon human beings. Yet many of our experiments are performed on our patients, and not a few of our methods of treatment and explanations thereof are unworthy of a Profession that would be learned. We hope the time is not far distant when the misguided sentimentality in the form of our vivisection laws will be corrected, and the restrictions of those laws will be amended; and that Dentists will join with the great majority of the Medical Profession in seeking the removal of such unfortunate enactments which trammel investigation, and place the veto of the State upon biological research of the vertebrata.

## GOSSIP.

During the recent sittings of the Examiners of the Royal College of Surgeons, Edinburgh, the following gentlemen passed their first professional examination for the License in Dental Surgery:—Leonard Latham Wilde, Winchester, and James Leslie Fraser, Inverness; and the following gentlemen passed their final examination and were admitted L.D.S.Edinburgh:—James Graham Munro, New York, and Alfred Henry Thomas, Chester.

The following edict was solemnly passed and duly registered in France, in 1770, under Louis XV.:—"Whosoever, by means of red or white paint, perfumes, essences, artificial teeth, false hair, cotton wool, iron corsets, hoops, shoes with high heels, or false hips, shall seek to entice into the bands of marriage any male subject of his Majesty, shall be prosecuted for witchcraft, and declared incapable of matrimony."

At a recent meeting of the Royal Microscopical Society a resolution was passed altering the bye-laws so as to make ladies eligible as Fellows of the Society, but without the right of attending ordinary meetings.

At a recent meeting of the College of Physicians, in Philadelphia, Professor Harrison Allen mentioned that spoken words can be represented by a series of curved lines on a receiving surface composed of white paper covered with soot. The experiments were suggested from watching the movements of the soft palate when conducting experiments connected with the human throat. By means of this device, Professor Allen is enabled to register upon the surface of the sooted paper the lines and curves which represent the various phonetic sounds of the human voice. In diagnosing cases of disease of the palate, this invention may prove of great value. By its aid Professor Allen has already discovered that many of the sounds which have long been considered by elocutionists and others to be formed by the direct action of the lips, the teeth, or the tongue, are in reality formed primarily by the direct action of the palate. The instrument has been named the Palate-Myograph.

To deny that experience, in successive generations, is the source of instinct is not to meet, by way of argument, the enormous mass of evidence which goes to prove that such is the case. And, continues Mr. George J. Romanes, if we take a broad view of all the instincts known to us and the combined weight of their testimony, the fact of transmutation is simply overwhelming.

The following appointments have been made to the National Dental Hospital:—Mr. Walter Tyrrell, L.R.C.P., M.R.C.S.; Mr. F. W. Hewitt, B.A., M.B., M.R.C.S.; Mr. C. W. Glassington, M.R.C.S., L.D.S.Edin., have been appointed Anæsthetists, in addition to Dr. H. F. Winslow. Mr. W. T. Patterson, L.D.S.Eng., has been appointed House Surgeon.

Towards the end of March last, a female, whilst travelling in a London omnibus, had her artificial teeth displaced and fixed in her throat. She was taken to the Royal Free Hospital, where she diep shortly after admission.

The Annual Meeting of the Eastern Counties Branch of the British Dental Association will be held in Cambridge on Tuesday and Wednesday, the 17th and 18th inst.

An article by Dr. W. D. Miller, in reply to the Paper on "The Influence of Micro-organisms in the production of Dental Caries," by Messrs. Underwood and Milles, read at the April Meeting of the Odontological Society, will be published in the next number of the Dental Record. Dr. Miller's article is already in type.

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# DENTAL RECORD.

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## MICRO-ORGANISMS AND DENTAL CARIES.

By Dr. W. D. MILLER, Berlin.

IN an Address delivered before the Odontological Society of Great Britain, on the 5th of April, 1884*, Messrs. Underwood and Milles presented some views relating to the "Influence of Micro-Organisms in the Production of Caries," which, if established, would tend to show some inaccuracies in the published results of my experiments.

In the first place Messrs. Underwood and Milles failed to produce artificial caries, and in their opinion, as well as in that of others then present, the production of artificial caries is an impossibility.

Inasmuch, however, as I have on various occasions demonstrated preparations of artificial caries here at the Physiological Institute, and to various well-known microscopists in private, the possibility of the production of artificial caries is a fact which does not admit of discussion.

Not alone the softening of the dentine, but the invasion of the micro-organisms, extension of the tubules, breaking down of the basis-substance, melting together of adjacent tubules, the production of round and oval spaces or caverns in the dentine, and lastly, the total disappearance of the dentine—all these may be exactly reproduced by artificial decay.

I shall demonstrate a large number of these preparations at Vevey on the 26th of August next, including the tubules which are shown in the *Independent Practitioner* for May. I can only say to all who doubt the possibility of artificial caries—Come and see. Messrs. Underwood and Milles failed to produce caries for very evident reasons, and, as it happens, those reasons I have given in a Paper written three months ago, and published in the May number of the *Independent Practitioner* and in the DENTAL RECORD, p. 158, etc. In the description of this attempt to repeat my experiments, Messrs. Underwood and Milles say: "The bottle not containing carbolic speedily became the scene of an active growth of micro-organisms, for the greater part micrococci; *a thick felt of this growth formed at the surface of the fluid.*"

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* See DENTAL RECORD, page 225.

I have up to the present time isolated five different species of fungi from carious dentine, one of which, from the constancy with which it occurs, may, I think, be regarded as a chief factor in caries. Neither this nor any other micro-organism thus far isolated ever forms, in pure cultures, a film upon the surface of the liquid. I am familiar with a felt such as described by Messrs. Underwood and Milles; it is not a schizomycete but a blastomycete; it has nothing to do with caries, and, as I stated in the *Independent Practitioner*, when it appears in the culture, the latter may as well be thrown away at once. *I have never succeeded in producing caries where this thick felt was present;* nor could I expect to under such abnormal conditions.

Messrs. Underwood and Milles do not state definitely what the felt consisted of in their case. I should, however, be very much surprised if it were not identical with mine; it was, at any rate, something which does not and could not well occur in the mouth, and did not occur in the experiments in which I succeeded in producing caries. This experiment, therefore, cannot be accepted as a repetition of mine. Messrs. Underwood and Milles state on page 239* that "the presence of a number of extraneous organisms does in some cases hinder the active growth of others." Perhaps it was this very felt present in their experiments, but not in mine, nor in the mouth, which accounts for their failure. Another great source of error in these experiments lies in the fact that the fungi themselves are rendered inactive by the acid which they have produced; we obtain, consequently, softening of the dentine, but no invasion of fungi. For a full description of this case and the methods employed to avoid it, I must refer to the columns of the *Independent Practitioner.*† Within a tooth the enormous extent of surface exposed by the lime salts to the acid prevents its ever becoming so strong as in our cultures.

Again, in the experiments described on pages 235-6 they failed to produce caries, "the putridity of the baths being so offensive" that they abandoned this experiment with relief.

I must confess to not a little surprise that the gentlemen should have kept up the experiment at all, for they say themselves (page 251), and I heartily endorse the statement, "we all agree that without some weakening of the enamel by acid nothing in the shape of caries could go on at all," and yet they wasted six months of valuable time in the vain attempt to produce caries in putrid baths which had an alkaline reaction. I have time and again called attention to an experiment which I began May 19th, 1882, over two years ago, in which pieces of dentine have been kept constantly in contact with putrefying substances richly infected from the mouth. Up to the present not a trace of caries or even softening of the sharp points has occurred, although microscopic sections show that here and there a coccus has worked its way into a tubule, which, of course, it might do if the walls of the tubule were of glass—that is no indication of caries.

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* Transactions of Odontological Society.

† See also DENTAL RECORD for March, April, and May.

It is a fact which I have had abundant opportunity to test, and which every Dentist can test for himself, that if we take a freshly extracted *decaying* tooth with pulp intact, thoroughly clean the root from pus, or whatever might produce an odour of putrefaction, remove the *débris* from the cavity, as well as the outer layers of most decomposed dentine and what remains, the truly decaying dentine will have a pure sour smell, never a putrid one. Furthermore, I have during the last six months had constantly in my laboratory from 10-50 cultures of different caries fungi in malt, beef extract, sterilized saliva, calves' broth, blood serum, etc., and have in no case, in pure cultures, observed anything offensive or putrid ; especially where sugar is present we always have a thoroughly pure sour, not at all disagreeable smell. It is not strange, then, that no caries occurred in those offensive putrid baths.

Messrs. Underwood and Milles' experiment confirms what I have written in the *Independent Practitioner* for 1883, that the fungi cannot attack sound teeth till they have been acted upon by acids. That this acid is produced largely by the organisms themselves will, I think, be found clearly established in the same journal for February, 1884.

It does not matter how "dirty-mouthed" a man may be, or how much putrefaction may be going on in the oral cavity, that won't produce caries—in fact, the alkaline products of the putrefaction may arrest caries by neutralising such acid agents as would give rise to it. It is only when the condition is such that the action of the micro-organisms is accompanied by the production of acid and a pure sour smell that caries can be produced.

Mr. Milles (page 241) describes a third attempt to produce caries, but here so important a factor is left out, and the solution used so abnormal, that we would be obliged to predict a failure in the very beginning.

I described at Ostende (1882) a series of experiments showing that fungi taken from carious dentine could not produce softening or decalcification of sound dentine, even when presented to them in the form of powder. In those experiments, however, I made the same mistake that Messrs. Milles and Underwood made in their later attempts to produce caries, viz., I put them under such abnormal conditions that they could not produce the acid necessary to decay.

In the human mouth we have sugar almost always, if not always, present, either taken into the mouth as such, or produced there by the action of the ptyaline of the saliva upon starch.

The fungus, which I consider to be the chief parasitic factor in caries, since I have never failed to find it in carious dentine as well as in saliva, while it has but a slight diastatic action, if any at all, has the power of splitting fermentable sugars directly into lactic acid, and of inverting non-fermentable sugars, *i.e.*, of converting them into fermentable varieties. These take place after the simple formulæ:—

$$\underset{\text{Cane Sugar}}{C_{12}H_{22}O_{11}} + H_2O = \underset{\text{Dextrose}}{C_6H_{12}O_6} + \underset{\text{Levulose}}{C_6H_{12}O_6}$$

$$\underset{\text{Fermentable Sugar}}{C_6H_{12}O_6} = \underset{\text{Lactic Acid.}}{2\ C_3H_6O_3}$$

We see, consequently, the vast roll played in the mouth by starch and sugar, and in our cultures the latter, at least, should never be omitted, since without it we will obtain but a slight production of acid, and, in most cases, none at all, and without acid we labour in vain to produce caries.

If Messrs. Milles and Underwood had added a little sugar to the blood serum the result would have been different; even then, however the whole difficulty is not overcome. The solution soon becomes so acid as to render the organisms completely inactive, and in liquid media they lie as a sediment on the bottom of the vessel.

I have sought to remedy this by adding pulverized dentine, and, frequently renewing the solution, I can produce softening of the dentine and penetration and expansion of the tubules in three weeks. I do not believe that this can be done in a stinking solution in three years—no, nor in 300 years. Mr. Tomes attributes the failure to produce caries to a lack of oxygen. It is probable, however, that in flask experiments the fungi obtain more oxygen than in the deeper parts of carious dentine. I have shown, moreover (in the *Independent Practitioner* for February, 1884) that these fungi may be successfully cultivated under oil or in flasks, where the atmospheric pressure is only $\frac{1}{100}$ the normal, or in flasks which have been deprived of oxygen by an alkaline solution of pyrogallic acid.

In discussing the question of the genetic connection of the different micro-organisms of caries I briefly say that I have never stated that all the micro-organisms found in carious teeth are forms of one fungus; far from it; but that there is one fungus found in the human teeth which produces cocci, bacteria, bacilli, and leptothrix, and that all these forms may be found in connection.

As stated above, I have, in the last three months, by means of the gelatine culture, isolated four other varieties. I did not suppose that this question would receive any attention from the Dental Profession;

it is, however, a subject which has excited a vast amount of discussion in Germany.

When, therefore, I published an account of this fungus in "Klebs' Archive, 1882," I did so with a full understanding of the question at issue. My preparations were twice demonstrated at the Physiological Institute, and to a great many mykologists in private. Dr. Eidam, of Breslau, assistant of Prof. Cohn, visited me in Berlin, and, after examining my preparations, remarked: "Ya, es ist gerade wie sie es beschrieben haben" (Yes, it is exactly as you have described it.) I can also show tubules of carious dentine containing micrococci in one end, bacteria in the middle, and bacilli in the other end; not by any means in all preparations, but in some. There is nothing peculiar in this case; many fungi are known which produce forms morphologically different. At the late Congress of the "Verein fuer Innere Medicin" preparations of the micro-organisms of pneumonia were demonstrated in which cocci were seen united to bacilli. I repeat, therefore, here, the statement made in the *Dental Cosmos*, 1883: "We may have before us a case in which one fungus can produce entirely different forms of development." Although I have already so often demonstrated this fungus I will be ready again to demonstrate it at Vevey to any one who should care to see it.

We come now to the zone of softened dentine. A discussion of this question seems almost unnecessary, since on page 231, Messrs. Underwood and Milles grant the only point for which I have contended when they say: "We do not deny that there is a great probability that the advance guard of micro-organisms may be surrounded, and, to a microscopic extent, only preceded by a softening, the result of the action of these acids, which they themselves produce." That is all I ask for. My object has been always to show the absurdity of the statements of that American school of *non*-investigators who maintain that the organic matter is first devoured by the micro-organisms, thus setting free the lime salts which are *subsequently* washed out mechanically.

I have shown by chemical analyses, which have nothing to fear from repetition, that in a large piece of carious dentine $\frac{12}{13}$ of the lime salts were gone, and only $\frac{2}{5}$ of the organic matter, thus proving that the decalcification was far in advance of the destruction of the organic matter; that is the point that I wished to establish, and I do not believe that Mr. Underwood differs from me there. Nevertheless, the zone of softened noninfected dentine is a thing which admits of easy demonstration in many preparations.

Some fifteen months ago I sent a number of such preparations to America, which passed freely around from city to city, and were carefully examined by a large number of microscopists. Not one of them, either for or against my views, ever denied the existence of the zone of softened dentine. One of those who have been most opposed to my views, writes: (*New England Journal*, p. 350) "There seems to be in many cases, at least, a territory of dentine between the portion that is absolutely healthy and the territory where the micro-organisms abound, that is *changed* somewhat, but not absolutely infected." He even attempts to account for this zone by the supposition that the micro-organisms absorb the protoplasm from the fibrils in advance of themselves, thus bringing about the change seen in Dr. Miller's specimens. However absurd the explanation may be, it shows that he recognises the zone.

Dr. Ross, of Chicapee, writes me that he finds it with ease. Dr. Boynton (*New England Journal*, p. 133) also recognises it. For my own part I have such an abundance of preparations showing it, that it would be difficult for any one to persuade me that it has no existence. It is when the caries is advancing at right angles to the dentinal tubules that it is particularly pronounced. Take a molar tooth with a medium sized aperture on the grinding surface, from which the caries has extended in all directions under the enamel, break away the walls of the enamel and then with a spoon-shaped excavator be sure that you scoop out *all* the carious dentine in one piece, cut on the freezing microtome, stain in Fuchsine, and in almost every case large tracts of carious dentine will be found on the sides that are free from organisms. Where the decay is advancing parallel with the tubules, the micro-organisms follow hard upon the softening which they themselves produce; in some cases a few stragglers even may get over the border. At the same time we will often find, even here, not a regular even zone, but large tracts of softened dentine free from organisms.

Messrs. Underwood and Milles' method of testing this question (page 249), is so difficult of carrying out as to render it absolutely impossible. Suppose we have a large cavity containing, say a layer of infected dentine 2 mm. thick, succeeded by a layer of softened, non-infected dentine $\frac{1}{10}$ to $\frac{1}{4}$ mm. thick. Now, if I were compelled on penalty of death to remove all the infected dentine, and to obtain from beneath a piece of the softened, non-infected dentine, without impurifying it by a single coccus from the overlying layers, I could not do it, nor do I believe that any mortal man can do it. I shall be prepared at Vevey to demonstrate these zones, or areas, of softened non-infected dentine on over 300 specimens; there existence is an absolute certainty. I shall there be prepared to cut and mount specimens from large pieces of carious dentine in the presence of the members, and demonstrate the areas of softened dentine on the same.

I believe, however, that here the difference between us is only imaginary. I hold simply that the fungi cannot attack sound teeth, until they have undergone a certain softening by acids; in other words the decalcification precedes the direct action of the fungi themselves; and if Messrs. Underwood and Milles are of the same opinion, as I judge they are, then there is no occasion to lose so much time in the dispute.

I wish to refer still to the remarks made by Mr. Coleman relative to the change produced in the teeth by exanthemata. This change, as I have frequently pointed out in the American journals, I consider to be entirely independent of micro-organisms; on the other hand it must be sought for in the chemical nature and the nutritive function of the tooth itself.

Why is it that a tooth is so much less soluble in acid, than an equal sized lump of tartar? or why if we mix together the separate constituents of the tooth in the same proportion as they exist in the teeth, do we find the resultant mass so much more soluble than a tooth? The answer is that in the teeth the lime salts form with the organic matter a definite chemical combination, which compared with the lime salts themselves is much more insoluble.

Now this combination we cannot bring about by simply mixing the constituents together; it is a result of the vital force in the tooth itself, and this same vital force which produced the combination can and, as it seems, does under certain conditions of ill-health dissolve it again, thus rendering the tooth more analogous to a simple mixture of lime salts with organic matter, and of course more easily soluble for acids.

This combination may be stable or unstable; in the former case the teeth are hard, shining, transparent; in the latter they are soft, chalky and opaque. It may at one time be stable, and as the result of some change in the vital or nutritive activity of the tooth, become unstable.

The resistance which a tooth offers to decay will therefore depend, to a certain degree, especially in youth, upon the health of the patient. In old age changes take place much less rapidly in the teeth than in youth, and as a consequence old teeth are not so subject to what we may call spontaneous caries as young teeth. Neither should pulpless teeth be exposed to it, and here is a chance to put this theory to a test. I do not offer the above as the result of experiment, but simply as something which appears to me to offer a possible solution of the question stated.

The fact that micro-organisms play an important part in the production of caries will at present be disputed by very few. It is a point insisted on by many earlier investigators on the subject, by Leber and Rottenstein, by Weil, and many others.

Messrs. Underwood and Milles and myself cannot claim to have done anything more than to have confirmed the views of those investigators, and perhaps to have placed the matter upon a more scientific basis.

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# ELECTRICITY: AND THE ELECTRIC LIGHT: IN REFERENCE TO DENTISTRY AND SURGERY.

By C. J. Boyd Wallis, L.D.S.Eng., &c.

## Part X.—Batteries—*Continued.*

Magneto-Electric, or Magneto-Faradic Machine.—Faraday's discovery of the induction of currents in wires by moving them across a magnetic field, suggested the construction of the well-known magneto-electric machines for generating electric currents in place of the Voltaic battery.

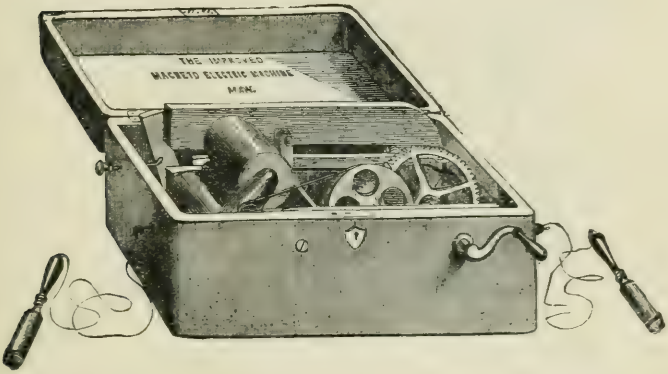
Pixii (1833), Saxton and Clarke in their early experiments fixed bobbins of insulated wire to an axis, which were spun rapidly in front of the poles of strong steel magnets. In Pixii's machine the magnet revolved, and in Clarke's improvement the coils were made to revolve instead of the magnet. But the currents thus generated were alternately inverse and direct currents, that is, the current in the coils is reversed in direction each time the polarity of the cores is reversed, which necessarily takes place at every half revolution of the inducing magnets or the coils. To correct and bring these alternating currents always in the same direction a commutator, which rotated with the coils, was fixed to the axis to turn the successive currents all into the same direction.

Improvements on this machine were made by Holmes and Van Malderon who constructed more powerful machines. The latter combined around one axis sixty-four separated coils rotating between the poles of forty powerful magnets, thus obtaining a nearer approach to a continuous current. It is upon this principle (the coils revolving at the poles of a powerful magnet) that the small magneto-electric machines, as sold in scientific instrument shops, are made.

The advantage of the magneto-electric machine is that it requires no galvanic battery to work it, therefore is a useful apparatus to have in cases of emergency, for it is always in working order and ready for immediate use. On the other hand for general medical purposes, the the galvano-Faradic or battery apparatus is preferable to the magneto-electric machine owing to the noise of the latter, the roughness of its shocks, and the labour of turning the handle.

A magneto-electric machine, Fig. 40, chiefly consists of an armature of soft iron revolving by mechanical means in front of the poles of a horseshoe magnet and a pair of coils of insulated copper wire. In Clarke's machine these coils are fixed to the armature with which they revolve ; in Duchenne's to the magnet itself. In the first case electromotive force is induced in the coils by the successive magnetisation and demagnetisation of the armature, due to the influence of the magnet in front of which it revolves. In the second case induction is produced by the variations in the magnet itself, due to influence of the armature. In both these forms only the currents arising during the passage of the armature *from* the magnet are collected for use.

Fig. 40.

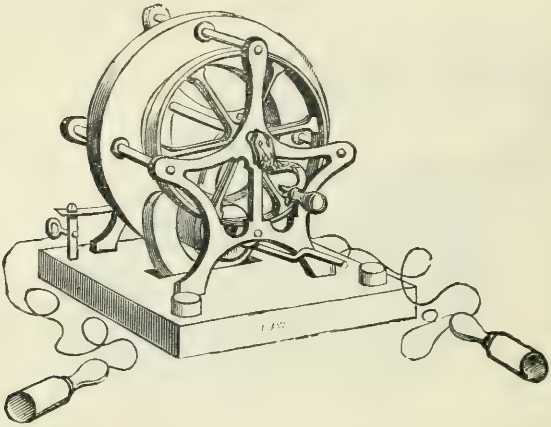


M. Gaiffe, of Paris, has improved upon the earlier forms of magneto-electric machines by combining the two systems and providing his apparatus with two pairs of coils, one pair fixed to the armature, the other to the coil. This increases the power of the instrument, while it allows of diminishing its size considerably. He has also fixed a commutator to the axis of the armature, which combines the currents of the two pairs of coils and transmits them all in the same direction to the positive pole of the instrument.

The importance of a uni-direction current from a magneto-electric machine is very great, for, unlike the galvano-Faradic make-and-break currents, of which, with the usual size of coils, the second has no perceptible physiological nor any chemical action, the to-and-fro magneto-currents are physiologically equivalent, and, moreover, they both have a decided chemical effect.

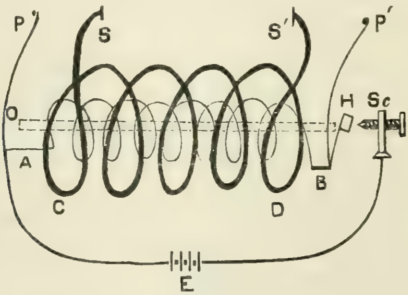
Fig. 41 shows one of Messrs. Maw and Co.'s magneto-electric machines with a circular magnet, and with wires and electrodes attached.

Fig. 41.



The Induction Coil.—The ordinary induction coils as used for medical purposes are constructed on the principle illustrated in Fig. 42, and depend on the same principles as the common induction coil, but they are made to give pulsations of comparatively small force but of larger quantity, by utilising the *extra* current of the primary itself, and by employing stouter secondary wires. The primary coil, A B, Fig. 42, is made of a short thick wire, one end of which is attached to the battery E, and the other to the hammer H ; a core, O, consisting of a number of iron rods, is placed inside the primary coil. The secondary coil, C D, is made of a long thin wire, and is entirely independent from the rest of the apparatus ; its two extremities are connected with the binding screws, S, S$^1$, to which the

Fig. 42.



rheophores are attached. Two wires which convey the extra current branch from the extremities of the primary coil, A B, and terminates at two other binding screws, P, P$^1$, for the rheophores. The strength of current is governed by a contrivance arranged for the purpose.

The action of an apparatus of this kind is as follows:—Directly the current begins to flow in the primary coil, the iron becomes magnetised, the hammer is attracted, and the contact between the screw and hammer broken. The current ceases to flow, and the iron is at once demagnetised; the attraction ceasing, the hammer flies back into contact with the screw. Again the current flows as before and the same succession of phenomena occurs. The rapidity of these *makes* and *breaks* depends upon the amount of freedom of play given to the spring carrying the hammer; this is usually regulated by a screw.

The strength of the induced current may be regulated by the distance created between the two wires—that is to say, if the secondary coil be removed from the primary the current rapidly diminishes in proportion to its removal.

Several ways of graduating the current are adopted by different makers of these coils. In some instruments the coils are both fixed, the secondary encircling the primary; both currents are then graduated by means of a copper cylinder encircling the iron core, which may be withdrawn at will. But the cylinder delays the induction process, and so weakens both primary and secondary currents. For diagnostic purposes the first method, viz., with the sliding coil, gives the best results, and enables us to establish comparisons between the current strengths employed. In its influence upon the induced current the soft iron core becomes magnetised during the whole time of the flow, and becomes demagnetised when the current is broken. The magnetisation and demagnetisation of the soft iron core increases the amount of electricity generated in the coils by the make and break of the battery current. Among the most approved medical induction apparatus are those designed by M. Gaiffe, of Paris, and of these the Sledge-Faradic apparatus is the most convenient and satisfactory. For medical purposes this apparatus is furnished with three secondary coils, the wires of which are of 66 m. 1·4 mm.; 198 m. 0·7 mm.; 600 m. 0·225 mm. in length and diameter respectively.

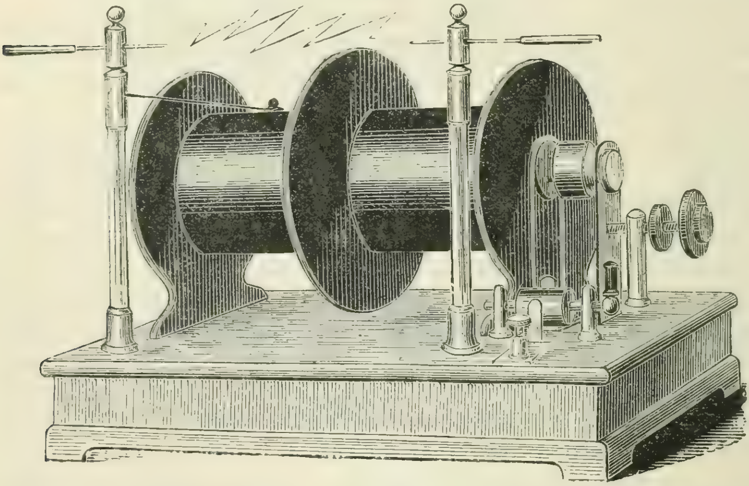
The generators M. Gaiffe employs are two Leclanché, or two chloride of silver cells. For some purposes he also employs the sulphate of mercury—an improved Marié-Davy—cell. The electromotive force of this cell is the same as the Leclanché's; it is very constant when worked through a high resistance, but it is less clean than the Leclanché, and is subject to the creeping of the salts.

RUHMKORFF'S COIL OR INDUCTORIUM.—Like those previously mentioned, this is a coil for the production of induced currents, in which a current is induced by the action of an electric current whose circuit is alternately opened and closed in rapid succession. These instruments may vary considerably in their construction, but all are based upon the same principle; and of all these forms Ruhmkorff's is the most powerful.

Induced currents have in general enormously high E.M.F., and will spark across spaces that ordinary battery currents cannot cross. With this apparatus and a battery of three or four Groves' cells, chemical, physical, and physiological effects may be produced superior to those obtainable with electrical machines, or even the most powerful Leyden batteries.

Fig. 43 shows an improved Ruhmkorff's coil, as manufactured by Messrs. H. & E. J. Dale, of London. They are made in several sizes to give from a half-inch to a six-inch spark respectively. They are well constructed with solid ebonite ends, and polished walnut base-boards. The *primary* or *inducing* wire is of copper of about 2 mm. in diameter, and 40 or 50 yards in length; the *secondary* or *induced* wire is also of copper, and is about $\frac{1}{3}$ mm. in diameter. These wires must be very perfectly insulated. The length of the *secondary* wire varies greatly, according to the size of the apparatus. In one constructed some years ago by Ruhmkorff this wire was 280 miles in length, but with such length the wire is thinner, about $\frac{1}{3}$ mm. Mr. Spottiswoode's huge induction coil, worked with 30 Groves' cells, yields a spark of 42½ inches length in air; the secondary coil consists of 280 miles of wire, wound in 340,000 turns, and has a resistance of 100,000 ohms. The potential of the induced electricity becomes higher with the increase of length and thinness of the wire.

Fig. 43.



THE CONDENSER.—To increase the strength of the induced current

Fizeau interposed a *condenser* in the primary circuit. This condenser consists of sheets of tinfoil placed over each other and insulated by larger sheets of stout paper soaked in paraffin or resin; these sheets of tinfoil project at the end of the paper; into this condenser the current flows whenever circuit is broken. The surface of each condenser so arranged may be, in large condensers, as much as 75 square yards. The whole is placed in a box, which forms the base of the apparatus; one of the coatings, the positive, is connected with a binding screw attached to the support of the hammer, which receives the current on emerging from the bobbin; and the other, the negative, is connected with a binding screw which communicates by a plate with the commutator and the battery.

The effect of the condenser is as follows: At each break of the inducing current an *extra current* is produced in the same direction, which, continuing in a certain manner, prolongs its duration. The spark that passes at each break between the hammer and the anvil is produced by this extra current. The condenser makes the break of circuit more sudden by preventing the spark of the *extra current*, due to self-induction in the primary circuit, from leaping across the interrupter; and it stores up the electricity of this self-induced extra current in order that, when circuit is again made, the current shall attain its full strength gradually instead of suddenly, thereby causing the inductive action in the secondary circuit at *make* to be comparatively feeble.

THE COMMUTATOR OR CURRENT REVERSER serves to cut off or reverse the direction of the battery current at pleasure. Many forms of commutator have been devised, but Ruhmkorff's is, perhaps, the most convenient for the coil.

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## REPLANTATION AND TRANSPLANTATION OF TEETH.

By R. THEODORE STACK, M.D.DUBL., F.R.C.S.;
Doctor in Dental Medicine, Harvard University; Dental Surgeon to the Adelaide Hospital; and Surgeon to the Dental Hospital of Ireland.

*Reprinted from the Transactions of the Academy of Medicine in Ireland.*
*(Concluded from page 275.)*

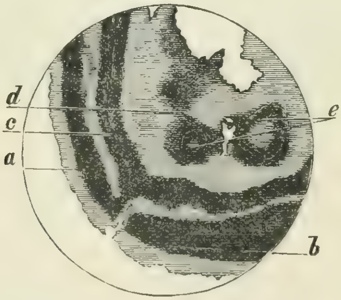
*Preliminary Report on the Examination of Sections of Human Teeth which had been re- or trans-planted and subsequently removed.* By P. S. ABRAHAM, M.A., B.Sc., F.R.C.S.; Member Court of Examiners, and Curator, Royal College of Surgeons, Ireland; and Pathologist to the Dental Hospital of Ireland.

Five of the specimens handed to me by Messrs. Stack and Baker have been examined. In two cases the teeth were immediately on re-extraction split, and portions, including some of the pulp, submitted to the action of a one per cent. solution of chloride of gold. The others were placed in a saturated solution of picric acid with about three per cent. of nitric acid, and when sufficiently softened were transferred to dilute and afterwards to strong alcohol. The sections were cut by means of Williams' microtome, and were doubly stained with picrocarmine and hæmatoxylin.

The investigation of the sections is not yet complete, and I only propose at present to call attention to some of the more obvious points which they exhibit.

In all the specimens a close organic union between the tooth and the alveolar periosteum, or rather that portion of it in the immediate neighbourhood of the tooth, is perfectly evident; and in some of the sections the osteogenetic layer of that tissue with its stratum of osteoblasts next to the cement is quite distinct. There is also in some cases undoubted evidence of a new formation of cementum in actual process. Dr. Hayes has been kind enough to photograph a spot in a section taken from a tooth where this is well shown. The periodontal tissue here appears to be normal and without any inflammatory cellular hyperplasia. Towards the apex of the root, however, we sometimes see the old cement and the dentine of the tooth undergoing a manifest erosion, and here osteoclasts can be made out, together with a well-marked small-celled infiltration or new growth in the neighbourhood.

Fig. 1.

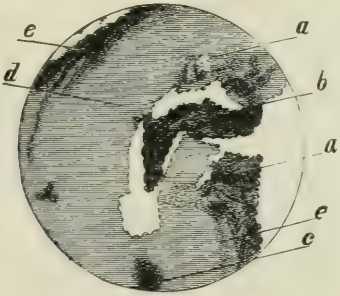


*Woodcut from a Photograph by* R. A. Hayes, *from preparations by* P. S. Abraham.

In certain of the sections which have hit off the apical opening of the root (Fig 1), a plug of tissue continuous with the periodonteum is seen entering towards the pulp cavity, and this plug contains vessels no doubt for the supply of the pulp. In both longitudinal and transverse sections of the pulp-cavity in several cases the tissue within shows evidence of life —nucleated cells of various shapes, and blood-vessels. I have not, however, yet been able to trace the connection of the last with the vessels in the in-growing plug of tissue or at the apex. These appearances are particularly noticeable in those specimens of removed teeth which had a healthy aspect. In one tooth—that of N. W.—which had become discoloured after replantation, disintegration of the pulp is far advanced, and innumerable bacilli are present, resembling very much in size the common bacteria of decomposition. The peripheral portions of the pulp sometimes show (*e.g.*, in tooth of A. C.) a longitudinal fibrous arrangement, so that an imperfect kind of membrane seems to be bordering the dentine, and processes from it can be seen, where it has been pulled away, extending towards the latter. In some of the sections prolongations of the periodontal tissue extend for some distance into the dentine, and I believe that some of them reach directly or indirectly into the pulp cavity. I am inclined, therefore, to think that nutrition in the middle of the tooth may thus sometimes be effected in two ways—through the apical opening and also by lateral processes from the fibrous tissue surrounding the root of the tooth.

In the transverse sections of one of the apparently healthy teeth—viz., the tooth of A. T.—a layer of "secondary dentine," of the nature of bone, has formed around the pulp cavity and upon the dentine. In the midst of the pulp of this tooth also a spicule of normal dentine with a radiate arrangement of its fibres has been cut across. These points are exhibited in Fig. 3.

Fig. 3.



*Woodcut from a Photograph by* R. A. Hayes. *from preparations by* P. S. Abraham.

A more detailed account of these teeth will, I hope, be published at a later date.

TABLE.—*Tabular Synopsis of* 31 *Cases of Replantation and Transplantation.*

| No. | Name. | Sex | Age | Tooth. | Condition. | Treatment. | Time out of Mouth. | Result. | Seen again. | Observations. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | K. T. | F. | 15 | L. L. Bi.$_2$ | Socket healthy | Transposed healthy left lower second bicuspid direct into healthy socket of right lower second bicuspid. | A few seconds. | Alveolar abscess | — | Cases number 1 and 2 occurred in same individual. |
| 2 | K. T. | F. | 15 | R. L. Bi.$_2$ | Do. | Transposed healthy right lower second bicuspid into healthy socket of left lower second bicuspid. | Do. | Firm and healthy after a few weeks. | — | *Vide* microscopical report (Figs. 1 and 2). |
| 3 | K. J. | F. | 14 | R. U. L. | Do. | Transplanted from another patient into healthy socket of right upper second bicuspid. | Do. | Firm, healthy, and transparent after a few weeks | 3 months | Transparent tooth apparently indicates living contents in pulp chamber. |
| 4 | L. H. | F. | 27 | R. U. Bi.$_1$ | Socket seat of long-continued abscess | Root of healthy scion tooth, which was immature, treated as recommended in text in cases of replantation—vulcanite splint, as tooth was so much smaller than socket it was in danger of falling out. | 15 minutes | Success | 2 months | Patient writes—"Tooth is quite firm and feels like one of my own." |
| 5 | M. M. | F. | — | R. U. L. | Do. | Scion tooth mature, introduced direct into socket of left upper lateral, for which it was somewhat too large. | A few minutes. | Do. | 3 months | Dull colour indicates death of pulp. |
| 6 | A. T. | F. | 12 | L. L. Bi $_1$ | Socket healthy | Tooth healthy, removed and replanted at once. | — | Do. | Do. | United peripherally: living contents in pulp chamber—*vide* microscopical report (Case 3). |
| 7 | N. W. | F. | 14 | L. U. Bi.$_1$ | Do. | Tooth immature, removed and replanted at once. | — | Tooth became quite firm after a short time. | Do. | After three months dark shade indicated dead pulp; second extraction required as much force as first; pulp found dead—*vide* microscopical report. |
| 8 | A. C. | F. | 16 | L. U. Bi.$_1$ | Do. | Removed and replanted at once; tooth not quite mature. | — | Success | 2 months | Root bifurcated and foramina large; removed after two months; as firm as ever—*vide* microscopical report. |
| 9 | A. S. | F. | 18 | L. U. L. | Do. | Tooth accidentally knocked out; replanted without treatment of pulp chamber. | 5 hours. | Do. | 6 years | Four years after accident slight gumboil; root had to be treated. |
| 10 | W. H. | M. | 13 | R. U. Ce. | Do. | Tooth knocked out; replaced at once. | — | — | 6 months | Tooth had a short conical, dwarfed root; is still somewhat loose; has periodontal adhesion; condition of pulp uncertain; was supported for some months by vulcanite splint. |
| 11 | W. R. S. | M. | 13 | L. L. Bi.$_2$ | Do. | Accidental extraction; replaced at once. | — | Success | 3 years | Tooth quite firm; transparent colour most likely indicates living pulp. |
| 12 | K. M. | F. | 11 ms. | L. L. L. | Do. | Knocked out by fall; replaced at once. | — | Do. | Do. | Tooth got quite firm. |
| 13 | M. O'C. | F. | 27 | R. U. Ce. | Do. | Knocked out and replaced. | 3 hours. | Do. | — | Tooth remained quite firm for many years; afterwards crown became seat of retensive caries and tooth was removed. |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 14 | L. W. | F. | 16 | L. L. Bi.$_2$ | Exposed pulp; socket healthy | Root creasote and iodoform; tip and crown amalgam. | 20 minutes | Fair success | 4 months | Can use tooth; slight fistula, tooth has a slight shake |
| 15 | M. F. | F. | 23 | R. L. M.$_2$ | Do. | Do. do. | 15 minutes | Success | 3 years | Tooth perfectly firm and useful; no sign of disease of socket; roots of this tooth were amalgamated. |
| 16 | T. E. | M. | 24 | R. L. M.$_2$ | Do. | Do. do. | Do. | Do. | 3 months | In extraction anterior root broke off and was removed separately; tooth has slight shake, but is useful for chewing. |
| 17 | S. M. | F. | 10 | R. L. Bi.$_2$ | Do. | Do. do. | Do. | Do. | Do. | Tooth quite firm and useful. |
| 18 | M. A. P. | F. | 17 | L. L. Bi.$_2$ | Do. | Do. do. | Do. | Do. | 2 months | Tooth firm and useful. |
| 19 | J. W. | F. | 13 | L. L. Bi.$_1$ | Do. | Do. do. | Do. | Do (?) | — | Tooth doing well for some weeks; patient then left for country and has not been traced. |
| 20 | A. M. | F. | 16 | R. L. Bi.$_1$ | Do. | Do. do. | Do. | Do. | 3 months | Tooth firm and useful. |
| 21 | A. C. | F. | 21 | R. L. Bi.$_1$ | Do. | Do. do. | Do. | Do. | 2 months | Do. |
| 22 | M. K. | F. | 28 | L. L. Bi.$_2$ | Do. | Do. do. | Do. | Do. | Do. | Do. |
| 23 | F. H. | M. | 24 | L. L. M.$_1$ | Exposed pulp, with incipient periodontitis | Do. do. | 20 minutes | Do. | 6 months | Do. |
| 24 | J. B. | M. | 20 | R. L. M.$_2$ | Exposed pulp | Do. do. | Do. | Do. | 3 months | Do. |
| 25 | H. W. | M. | 23 | L. U. Ca. | Acute alveolar abscess | Root creasote and iodoform; tip and crown amalgam; free incision into abscess. | 15 minutes | Do. | 6 months | Tooth firm and useful; all trace of alveolar trouble gone. |
| 26 | A. T. | M. | 24 | R. U. Ca. | Do. | Do. do. | Do. | Do. | 1 year | Tooth firm and useful; all trace of alveolar trouble gone. |
| 27 | M. C | F. | 19 | R. U. Ce. | Chronic alveolar abscess, with necrosis of alveolus | Do. do. | 20 minutes | Do. | — | Still under observation; after treatment smart alveolar abscess; three weeks later tooth apparently getting firm. |
| 28 | A. H. | M. | 21 | L. L. Bi.$_2$ | Chronic alveolar abscess | Extracted; pared root; crown and tip filled amalgam; roots creasote and iodoform. | 15 minutes | Do. | 6 months | Tooth firm and useful. |
| 29 | F. B. | M. | 25 | L. L. M.$_2$ | Obstinate suppuration of periodontal membrane | Roots filled oxychloride; crown amalgam. | $1\frac{1}{2}$ hours | Do. | 8 months | Three roots; tooth firm and useful. |
| 30 | M. R. | F. | 30 | L. U. Bi.$_2$ | Inflammation of root membrane | Both roots filled oxychloride pulp chamber; Jacob distal surface cohesive gold; filed grooves for drainage. | 2 hours | Do. | 2 years | Course of recovery complicated by some small alveolar necroses; eight months later removed again, as some painful symptoms were attributed to exostosis; new deposit removed and tooth replaced, having been out of socket three minutes. |
| 31 | K. D. | F. | 30 | L. L. M.$_1$ | Alveolar abscess, absorption of outer wall of socket | Diseased cement pared away; roots filled oxychloride; crown oxyphosphate; seton from buccal wall. | $1\frac{3}{4}$ hours | Do. | Do. | —— |

# DENTITION AS INDICATIVE OF THE AGE OF THE ANIMALS OF THE FARM.

By Prof. G. T. BROWN,
VETERINARY DEPARTMENT OF THE PRIVY COUNCIL.

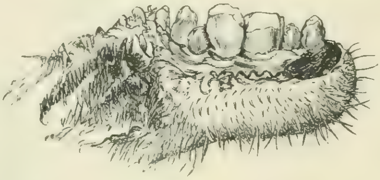
*From the "Journal of the Royal Agricultural Society of England."*

(*Continued from page* 270.)

## THE TEETH OF THE SHEEP.

THE terms which are applied to the teeth of the ox for the purpose of description may be used in regard to the teeth of the sheep. Eight incisors, central, lateral, middle, and corner teeth, are found in front of the lower jaw only, the corresponding part of the upper jaw being provided with an elastic pad, as in the ox. Molar teeth are designated by numbers, to indicate their position; and, for the present purpose, these teeth in the sheep may be described as corresponding to the molar teeth of the ox in all general points, excepting in regard to their size. At birth, the arrangement of the incisor teeth of the lamb is peculiar, as shown in Fig. 34.

Fig. 34.—*Incisors of Lamb at birth.*



Generally the whole temporary set of teeth may be recognised, but only in outline, as they are nearly covered with the gum. The central incisors are most advanced, and next in order come the laterals, leaving the middle and corner teeth considerably below them. Very often, the cutting edges of the front and third pairs of teeth are through the gum. All these peculiarities are seen in the illustration, which may be accepted as the representation of the ordinary appearance of the teeth of the lamb at birth.

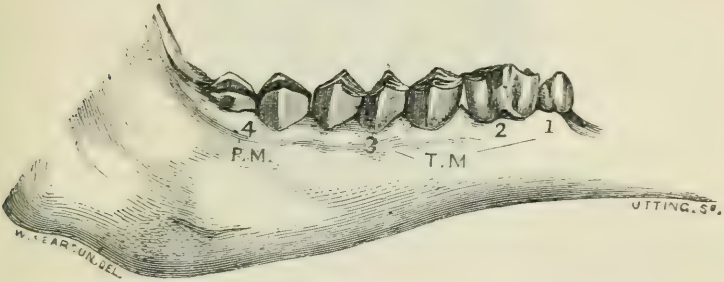
By the end of the fourth week all the temporary teeth are well up, eight incisors; and three molars on each side of the upper and lower jaws.

From the time of the perfect eruption of the temporary teeth at the age of one month, to the cutting of the first pair of broad teeth, central permanent incisors, at the age of one year to fifteen months, the only changes which will guide the expert to a correct opinion of the age are those which affect the molar teeth.

At three months the first permanent molar, the fourth in situation, is cut, and is recognised by its recent appearance in comparison with the tooth immediately in front of it, the third temporary molar, which shows signs of wear.

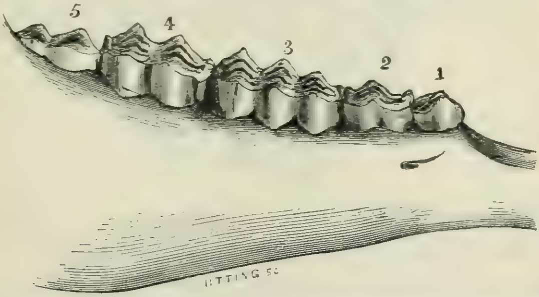
In the next illustration (Fig. 35) the appearance of the molars at the age of three months is shown.

Fig. 35.—*Molars of Lamb at three months.*



During a period of five or six months from the cutting of the fourth molar there is nothing to guide the examiner except the growth of the teeth and of the jaw, which results in leaving a space behind the fourth molar. At the age of nine months this space is occupied by the fifth molar, as shown in the drawing (Fig. 36).

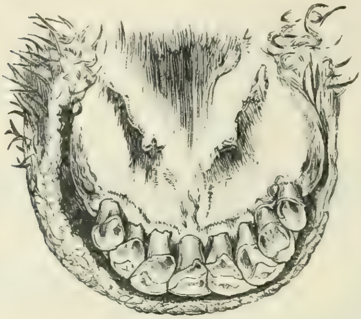
Fig. 36.—*Molars of Sheep at nine months.*



A one-year-old sheep's teeth will present the following appearances. Incisors are worn on their upper surfaces, especially the central and middle teeth. In sheep which are feeding on turnips, some of the incisors, and in certain cases all of them, are broken off, and in very forward animals the central permanent incisors are cut, but they are never perfectly level and regular at this age. In the drawing (Fig. 37, see p. 308), the average state of the incisors in a well-preserved mouth at the age of one year is shown.

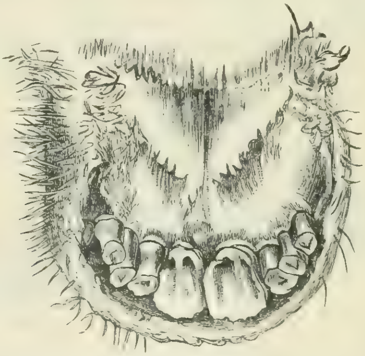
Looking at the back of the mouth, the examiner will see the fifth permanent molar standing well out from the jaw, while the teeth in front of it are all worn on the surfaces; these appearances, taken in connection with the state of the incisors, will enable him to assert that the sheep is about the age of one year.

Fig. 37.—*Incisors of Sheep at one year.*



The first broad teeth, central incisors, are usually cut soon after one year old, and are well up at fifteen months as shown in the next illustration (Fig. 38).

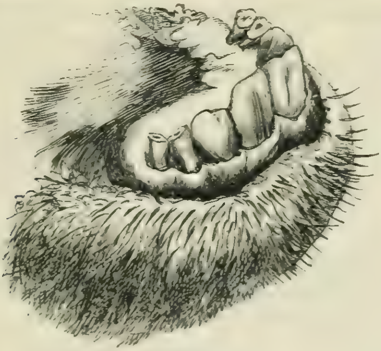
Fig. 38.—*Incisors of Sheep at fifteen months.*



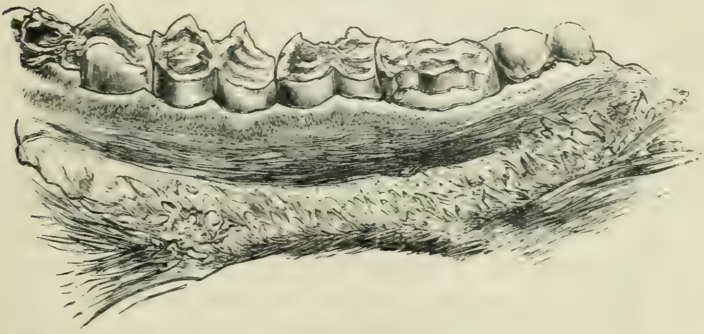
At eighteen months the sixth permanent molar is cut, and the recent appearance which this tooth presents is better evidence of this age than can be obtained by an inspection of the incisors. Occasionally in very forward mouths the second pair of broad teeth will be cut; in other cases there will be no signs of their appearance until the sheep is approaching the age of two years; so far, therefore, as these teeth are concerned, the examiner is left in doubt as to whether the sheep is one year and six months or two years old, and it is absolutely necessary that he should inspect the molars, in which important changes occur between the ages of fifteen months and two years.

As the sheep approaches one year and a half, the sixth molar begins to protrude through the gum, and shortly afterwards the two anterior temporary molars have given place to the permanent teeth, and the third temporary molar is a mere shell covering the top of the permanent tooth. This condition of the mouth is represented in the next figure (Fig. 39, see p. 309).

Fig. 39.—*Incisors and Molars of Sheep at one year and ten months.*



A. Incisors.



B. Molars.

The presence of six broad teeth in the front of the mouth is shown in the next illustration (Fig. 40.)

Fig. 40.—*Incisors of Sheep at two years and three months.*

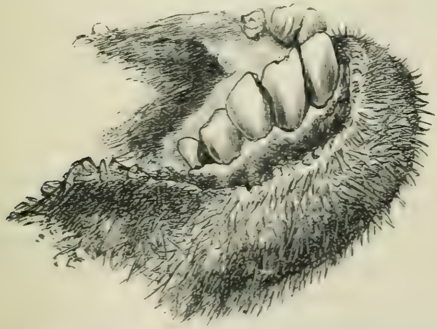
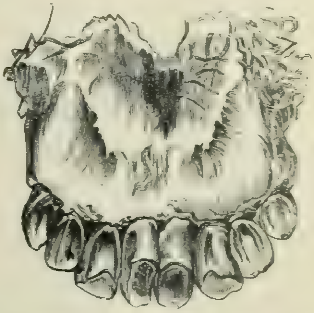


Fig. 41.—*Incisors of Sheep at four years.*



These teeth may be looked for in many sheep which are entered as not exceeding two years old, and no objection can be made on this ground, although the third pair of incisors are not, under ordinary circumstances, present before two years and three months.

Some difficulty may arise in the mind of an inspector who finds these different appearances in sheep which are in adjoining pens, or even in the same pen. But in such circumstances no hesitation need be felt in accepting the evidence of the molars, and disregarding that of the incisors.

The cutting of the corner incisors, or fourth pair of broad teeth, takes place on an average about nine months after the lateral incisors are in the mouth, and may be taken as an indication that the sheep is over the age of three years. In some cases the corner teeth do not appear till the animal is nearly four years old, so that there is a possibility of a mistake being made as to the age, to the extent of a year, by an examiner who contents himself with an inspection of the corner incisors. No difficulty, however, would be experienced in deciding whether the corner incisors represent three years and a quarter or four years, if the state of the other incisors is taken into account. At four years of age the six broad teeth will show marks of wear, the central incisors especially will be worn hollow on their upper surfaces, the middles and laterals also showing well-marked tables in the place of sharp cutting edges; while the recently cut corner incisors, supposing their eruption to have been delayed till the sheep was nearly four years old, will present a marked contrast to the rest of the teeth which have suffered from attrition. These appearances are shown in the drawing (Fig. 41) of the mouth of a sheep at the age of four years.

After the age of four years, and indeed from the time of the completion of permanent dentition, whether early or late, the changes which are effected in the form of the incisors by wear vary according to the nature of the food, and the examiner must be content to limit his inquiries to the period within which is comprised the eruption of the permanent teeth.

(*To be continued.*)

## THE CROWDING OF TEETH A CAUSE OF DECAY.

The habit of some Dentists using the V-shaped separating file, and thus making a corresponding-shaped separation between the teeth from the grinding edge down to the gums, is unreasonable, injurious and barbarous, and constantly inconvenient to the patient. Food accumulates in such places, and is forced into a more and more compacted form in spite of all efforts to keep it out. How ever such a cruel, destructive and unphilosophical tool could have been invented, and especially how it could have survived the age of cant-hooks is a mystery. And yet there are Dentists who use them now, as there are some old fogey physicians who still use the cant-hook. Nature designed that the teeth should have a greater width between them at their necks than at their grinding surfaces: and this, as a rule, is their condition when the Dentist first sees them. As the food, therefore, is pressed upon the surfaces of the teeth all that passes into these interstices is freed from any wedging as it passes towards the necks of the teeth. There is another peculiarity in the approximal surfaces of the teeth. They are rounded from the centre outwards and inwards; so that as Nature shapes the teeth it is difficult for food to remain between them. In filing teeth for separation no sharp corners should be left, either on the outside or inside, and the interstices should be made much wider towards the inside; in fact, this, and all other artificial work should not be in view to a casual observer any more than is possible. Of course, to accomplish this, many approximal cavities must be filled from the lingual side. This is difficult at first, both for the Dentist's position and for the skilful use of the packing instruments. But, by practice, it will become much easier than at first appears possible. Many prefer the three-cornered V-shaped reamer to the file for producing this separation, but this requires the use of the engine and the back-action attachment. With these facilities—especially when the motion can be so great as with the Bonwill engine—the work is done very quickly, smoothly and painlessly. "But can the teeth be so separated as that they will not again come together?" No, not generally; neither is it specially desirable. Let them come together as Nature generally placed them. But you will observe that in a normally-arranged set of teeth they bear upon each other near their grinding or cutting surfaces. Decay seldom attacks them here, and by this arrangement the spaces are easily kept clean—generally without artificial helps. If there are approximal cavities they should be filled so flush and convex that tooth cannot thereafter touch tooth, except as above indicated. Sometimes considerable building out is necessary to effect this, but the extra labour is well invested.—*Items of Interest.*

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# DENTISTRY AS A BRANCH OF GENERAL SURGERY.

By R. J. Pye-Smith, F.R.C.S.

*A Paper read at the Annual Meeting of the Midland Branch of the British Dental Association, at Sheffield, on 30th April, 1884, and reprinted from the Journal of the Association.*

I take it that my presence as an ordinary Surgeon with you to-day is intended to serve as a recognition of the unity of Medical Science and Art, and, more particularly, to direct our attention to the intimate relations of Dentistry to one great division of the healing art, namely, Surgery, of which indeed it forms a by no means insignificant or unimportant branch. Insignificant it cannot fairly be called, when we consider that it involves the consideration of such large subjects as ethnology, heredity and civilization, the influence of climate, of diet and of hygiene, the effects of mental development, and the history, past and prospective, of the physical development of the human race. Nor, I venture to think, can that subject be deemed practically unimportant which deals with a part of the body of almost lifelong and constant use in more than one of the most important functions of life, exercising in its physiological and pathological conditions, a most extraordinary influence on other and even remote parts of the body, and frequently accompanied, in one of the commonest diseases to which it is prone, with an amount of acute pain that thoroughly incapacitates the sufferer for anything beyond endurance.

But though the study of the teeth in normal and abnormal conditions possesses such great interest, it is one too much, I fear, neglected by members of the Medical Profession in general. This may probably be in great part accounted for by the fact that it is only a little more than five years since Dentists obtained, in this country, that recognition by the State which is an essential element of the well-being of their Profession and of protection to the public for whose service it exists.

In framing the Dentists Act it was, of course, necessary to respect the vested interests of those who were already practising Dentistry, and their claims were met by a concession similar to that which to this day allows anyone to be put on the Medical Register who was in practice as a medical man before the first of August, 1815. But whilst there may be some among the 5,000 so admitted to the Dentists' Register whose only claim to be an ornament to the Profession must be based on the show-cases they exhibit to an admiring public, it cannot, I think, be denied that the course of study required for the licentiateships in Dental Surgery, which (except for certain foreign and colonial degrees) are now the only registerable qualifications, is in a high degree satisfactory, even when compared with the curriculum of the Medical Student, and cannot fail to produce a class of men who will be a credit to their Profession and do honour to those who were mainly instrumental in obtaining that Act, among whom the name of John Tomes must hold the highest place of honour.

It would, of course, place the Dental Surgeon in a much higher position if he were fully and legally qualified as a medical practitioner; but it is, perhaps, hardly reasonable to expect that every man who intends from the first to devote himself to a branch of Surgery, which is, after all, to a very large extent, mechanical, should undergo the full training necessary for a medical man (including the expenditure of extra time and money) in addition to the training requisite for a Dentist. The analogue, as regards Dentistry, of the Ophthalmic Surgeon and of the Aural Surgeon must (at least, for the present) be found in the few who are willing to undergo the extra training, and to devote the extra time, to add the speciality of Dentistry to a full Medical and Surgical training, or to carry on their studies for the Dental Diploma to the acquirement of a full Medical and Surgical Degree. And it cannot be doubted that a thorough study of the diseases of women and of general pathology, as well as practical work in histology and in clinical medicine (which are among the few medical subjects omitted from the Dental Student's curriculum), must prove of the utmost value to the Consulting Dentist. A special course on anæsthetics is also, I think, a desideratum both for the Medical and for the Dental Student.

On the other hand, the Medical Student must remember that he is as much neglecting what is fairly demanded of him if he fail to acquaint himself with at least so much of Dental Surgery as will enable him to use efficiently and intelligently all methods and instruments of investigation, and to know what general plan of treatment ought to be adopted in a given case, though he may lack the manipulative skill and knowledge to carry it out efficiently himself, as he would be neglecting what is also expected of him if he did not avail himself of the opportunities, open to him at every medical school, of learning the use of such instruments of investigation as the ophthalmoscope, the laryngoscope, or even the stethoscope and the various specula.

What ought to be expected, in the way of specialism, of the general medical practitioner is that he should be able in every department of his calling to eliminate cases requiring special skill and practice in their management from cases which he is himself perfectly competent to treat, and should be then able to give sound advice as to where such cases should apply for the treatment he feels himself unable to the best advantage of his patient to undertake. I cannot but think that if medical men were more alive to this latter part of their duty they would have in their ranks less of those thriving humbugs who are celebrated among a necessarily ignorant public for some special class of case, merely because they are able, by advertisement of one kind or another, to force themselves upon the public, and through them upon the general practitioner, who is ignorant alike of the real requirements of the case, and of who are the good and honest men in the Profession to whom, in justice to the patient, the case ought to be sent.

Specialism in the practice of Medicine has its justification in the enormous field and abundant fruitfulness of modern research, together with the special skill required in the use of instruments and apparatus in certain of its departments. And, whilst the technicalities of Dental

Manipulative and Operative Surgery as much demand its separation as do those of Ophthalmic Surgery, it is satisfactory to note that the teeth, like the eye, furnish a good field for exact and thorough observation and treatment. The application, already to a high degree made, to the various morbid conditions of the teeth, of scientific methods of investigation and treatment cannot but have a beneficial influence not only on Dentistry, but also on General Surgery. The exactitude which is attainable, in consequence of the accessible position of the teeth, whether in observation, in experiment, in diagnosis, or in treatment, must furnish an example of great value to those concerned with the more obscure organs and conditions of the body. The Specialist, on the other hand, be he Dentist or Oculist, can ill afford to ignore the general methods of investigation, of reasoning and of treatment, employed by the General Surgeon or Physician, whose loss, by lack of concentration is, perhaps, more than compensated for by his gain in breadth of view. Nevertheless, lack of concentration is a real loss. The very limitation of the area of activity enables a man to dig deeper into the mine of knowledge, and to cultivate to a higher perfection the field of practical skill. When reading or observing the best results of Specialism, one feels sometimes tempted to seek to follow such brilliant examples of thoroughness in some one department to the exclusion of general practice, but the first difficulty is that one would not know which Speciality to choose, since each is so full of interest!

Specialism in study needs no apology: it is only Specialism in practice that has to be defended on the ground of the practical exigencies of the case. A man engaged in the general practice of Medicine or of Surgery, or of both, may well make a special study of whatever class of cases he may have good opportunities for observing, or in which he may feel a particular interest. Only let him remember that whilst pursuing his hobby he is in honour bound in no wise to neglect whatever else he professes to understand. Still more is it necessary for the practitioner of any Speciality that he should cultivate a wide, even if somewhat superficial, acquaintance with various kindred departments of science and practice. Otherwise he is in danger of becoming narrow-minded and even conceited (which would be highly detrimental to his own well-being), as well as of overlooking important side-issues and general indications (which might be highly disastrous to his patients).

The best practical remedy, or rather preventive, for such a tendency is direct communication with men who are practising in other departments, both special and general; and one of the most important methods by which such communication may be attained, not only with the men themselves, but also with their practice, is by having, at every general hospital (which ought always to be a centre for professional activity) a special department in each of the recognised branches of practice. Such departments are superior, as a rule, to special hospitals, not only in economising time and labour and expense on the part of the public (both benefactors and benefited), but also in promoting and facilitating that interchange of experience and widening of interest which tend so much to advance the best interests of the Profession and the public. Another method of still wider applicability, and one which already has borne good fruit and deserves to be fostered, is by members of a scientific society uniting occasionally with those of some other society, more or less closely related in its objects, for the discussion of matters of interest to both. Such friendly scientific intercourse can scarcely fail to be useful and pleasant to both the parties concerned.

No one, however, engaged in any branch of the healing art, however limited it may be, need fear that he will ever become a mere machine. Such a pitiable condition may, as Mr. Ruskin warns us, befall a man who, in the modern division of labour, is all day long occupied in making the point of a pin or some other article of which each is a facsimile of every other ; but in dealing with the ailments of the human frame we never find two cases exactly alike, and the differences in their details and in their needs leads the observant practitioner to compare, to reflect, to contrive ; and thought, in any of its phases or results, will assuredly save him from sinking to the level of a mere machine.

But the interest of Dentistry is by no means confined to mere affections of the teeth. The disturbances of the nervous system which are produced not only by diseased conditions of the teeth, but also by the process of eruption—both of the temporary and of the permanent set—lead, in no inconsiderable proportion of cases, to results, many of which would not be credited were not their occurrence attested by undeniable facts. Indeed there is only one other organ, the uterus, which, with its appendages, in any way rivals the teeth in the distant and general complications to which they may give rise.

Time forbids my doing more than name the best observed varieties of such recorded cases with which I am acquainted. Neuralgia, especially of the various branches of the trigeminal nerve, is universally recognised as usually originating in the teeth. Spasm, paresis, and paralysis of muscles are also of tolerably frequent occurrence, under the forms of clonic spasm of the orbicularis palpebrarum, wryneck, tonic spasm of the masseter and even tetanus ; strabismus, asthenopia, facial paralysis, paralysis of the arm, and perhaps also of the leg—several observers considering that cases of infantile paralysis are sometimes due to the irritation of dentition—whilst deafness and amaurosis may undoubtedly be produced by disease of the teeth, either directly or through the neuralgia to which they give rise. Convulsions, very frequently in children, and rarely epilepsy; occasionally hysteria, delirium, and even insanity, own a like exciting cause, and syncope is not unknown from the depressent action on the heart through the pneumogastric nerve, which, according to Dr. Brunton, is liable to occur from the extraction of a tooth under a slight degree of anæsthesia from chloroform. Interference with the general nutrition of the body may also occur, sometimes, perhaps, from the constant inhalation of foul breath, but especially as a result of dyspepsia, constipation, or diarrhœa, produced either by reflex nervous influence from dental irritation, or by the mechanical interference with digestion which results from the loss or tenderness of teeth, whilst local evidence of reflex malnutrition is seen in such cases as those of blanching of the hair on the temple, of kerattis, phlyctænular or ulcerative, and of ulceration of the external auditory meatus from the irritation of a carious tooth. Dysuria, leucorrhœa, and abortion must also be mentioned in this list, as well as various rashes of the skin; and lastly, but certainly not least in importance, cases of hip-joint disease should, according to Dr. Joseph Mulreany, be also included, for he believes almost every ordinary case occurring in young children to be due to the eruption of the first permanent molars.

Even this list, formidable as it may appear, is by no means exhaustive of recorded cases, nor does it touch another line of contact between Dentistry and General Medicine, namely, that afforded by diseases which stand to morbid conditions of the teeth in the relation rather of causes than of effects. Under this head we may range inherited syphilis, leading to the now well-known forms of notched and pegged incisors, whose significance was first recognised by Mr. Jonathan Hutchinson; rickets, giving rise to rocky enamel and imperfectly calcified dentine, and gout, associated with teeth that wear deeply and evenly down; scurvy, stomatitis, and mercurialism, affecting the gums, and lead poisoning, causing in the neighbourhood of the teeth the punctiform deposit of sulphide of lead in the characteristic blue line; dyspepsia, phthisis, pregnancy, fevers, and other general conditions, with their effects on the nutrition and surroundings of the teeth; and lastly, hæmophilia, so serious a condition wherever hæmorrhage is involved, as even by so slight an operation as the extraction of a tooth.

I must now touch but lightly on what, when I gave the title for my Paper, I had intended to have been my main topic—the Surgery of the Mouth in Relation to Dentistry.

Malformations of the mouth are of great interest to the general Surgeon, to the Dental Surgeon, and also to the Dental mechanician.

In hare-lip, I suppose the good effect of early operation is as obvious to the Dentist—in the moulding influence which the lip exerts on the alveolus—as it is to the general Surgeon in the facility which it affords to the infant for sucking. With regard to cleft-palate, there is not the same unanimity in favour of early operation, nor, indeed, in favour of operation at all. The high degree of perfection in workmanship and in adaptive skill, which has lately been brought to bear by members of the Dental Profession on the production and fitting of obturators, has led to serious questioning as to whether such aids are not superior to the results of successful operation. In some cases, as where there is great deficiency in tissue, and where the patient is from any cause a bad subject for operation, I think there can be no doubt that mechanical appliances are to be preferred to surgical operative interference, though we must remember that in all such cases the subject of the deformity is dependent for relief on the integrity of an instrument which is liable to wear out, to break, to lose its fit, and even to be swallowed, whilst an operation—if successful—is good for life, and makes the subject of it independent of extraneous aid. The swallowing of dentures is not such a very uncommon accident. Mr. Felix Weiss collected more than a score such cases, and his summary of them is published in the "Transactions of the Odontological Society" for 1877. During the last two years two such cases (one of which occurred in my own practice) were brought before the Medico-Chirurgical Society of this town. In both these instances the plate was passed per anum without doing the patients any damage; but fatal cases have been recorded, from hæmorrhage, inflammation, and sloughing. It would be, I think, a precaution worth taking if those who wear artificial plates of any kind were to keep a sketch showing their exact shape and size, in case it ever became a question of endeavouring to extract them after accidental swallowing. It is not, I hope, unreasonable to expect that improved methods of operating for cleft-palate will in the future enable the surgeon to achieve success in cases of which, at present, he is almost hopeless. The modern expedient of sponge-grafting may possibly, I think, find a very useful application in such cases, by affording the means of filling up gaps which are otherwise too great to be bridged over by the soft tissues of the palate.

Amongst injuries to the jaws, fracture claims the most important place, and here the Dentist and the Surgeon must combine their efforts to obtain the best results. Gladly do I acknowledge the good service rendered in this class of cases by the introduction of such apparatus as Mr. Moon's and other interdental splints, which can be efficiently applied only by one well-skilled in the technicalities of Dental mechanism.

Of tumours affecting the mouth and jaws, the most interesting, perhaps, both to the general and to the Dental Surgeon, are dentigerous cysts. It seems probable that many cases formerly described as *hydrops antri*, cystic tumours of the jaw, and even innocent solid growths, are of this nature. It would be interesting to know whether such tumours are of increasingly frequent occurrence or not; for the crowding, and consequent irregularity (and, I suppose, also caries), which seem to be resulting from the lessening dimensions of the jaws in this age of cerebral development, must have a tendency to produce that malposition—especially of the canine teeth—which is probably one of the chief causes of the occurrence of such cysts. On the other hand, the non-survival of the wisdom teeth may, we may hope, rectify this tendency and prove to be Nature's solution of the problem—how to keep a good set of teeth in jaws of lessened capacity.

After operations for the removal of large portions of the upper or lower jaw—as for cancer—the mechanical aid of the Dentist is of the greatest value to the patient, in supplying him with a substitute for what the surgeon has removed. My friend, Mr. Frank Harrison, lately made such a denture for a case in which I had excised the right upper jaw, and I regret that I cannot introduce the case to you to-day, to show the comfort that the patient has derived from it.

With regard to abscess, whether alveolar or antral, we should bear in mind that pyæmia is a possible, though extremely rare, consequence. A fatal case was reported in the *Medical Times and Gazette* eight years ago, by Dr. Goodhart. Another complication attending abscess of the antrum, but, fortunately, also exceedingly rare, is the extension of inflammation to the orbit and optic nerve leading to blindness in quite a different way from that referred to in connection with reflex nervous affections.

But to me the most interesting question in general surgery associated with inflammatory affections of the teeth and alveoli is that of antiseptics. A tooth furnishes an excellent opportunity for the experimental study of this important subject. The soft and sensitive vascular pulp is hermetically incased in the hardest of animal structures, and communicates with the softer tissues only by a pinpoint orifice. It follows from this arrangement of the structures that inflammation of the pulp, if at all general, is very painful—from the squeezing to which the nervous filaments are subjected in the swelling of the soft tissues in their unyielding case—and also that it is almost sure to go on to necrosis—from the same crushing action exerted on the confined protoplasmic tissues. But death of the pulp may take place painlessly and without inflammation, as when it results from severe mechanical injury which has expended itself in snapping off the blood supply of the pulp. In such a case the tooth may remain quiescent for years, the dead pulp probably undergoing fatty degeneration but not putrefying, as is sometimes proved on the extraction of such a tooth. But it is well known that teeth so injured and killed without inflammation do, frequently enough, after a time, set up violent inflammation in the alveolus, resulting in a septic abscess. Such inflammation is the usual result when death of the pulp occurs secondarily to caries. But in this latter case we know, from the researches especially of Messrs. A. S. Underwood and W. J. Milles, that germs are always abundantly present; and it is their action on dead protoplasm, or serous fluid, which gives rise to the putrefactive products on which septic or infective inflammation depends. Now, in the former case (that of alveolar abscess arising after death of the pulp without caries) the first important question is—"Has the dead pulp (which seems evidently to have been the starting point of the abscess) undergone putrefaction?" For if not, how can it have infected the alveolus? Mr. Charles Tomes, in a very interesting Paper read at the Annual Meeting of this Association in 1882, answers this question in the affirmative, stating that in such cases he has always found the pulp to be stinking. We ask, then, secondly, "How has the dead pulp become putrefactive? And can it have undergone putrefaction without the agency of germs of some kind?" To assume that putrefaction can occur without the agency of living germs would be opposed to all modern teaching; but let us ask, "Can germs be shown to be present in this putrefying pulp? And if not, why not?" Mr. Tomes' answer to this question is less positive. He says, "Organisms have not so far been satisfactorily demonstrated in them (*i.e.*, the pulps), and he states that he himself had usually failed to find any. But if we further ask why in these cases germs are to be found only occasionally, and in small numbers, I think we have a possible explanation in the fact that the tooth-pulp is so absolutely enclosed that there is no escape whatever (as in the case of caries there might be) for any of the products of putrefaction, so that a small number of bacteria might perhaps give rise to an amount of septic material sufficient to infect the alveolus through the apical foramen, and to be detected by the sense of smell, while yet the few bacteria themselves might be overlooked. If such an explanation be considered possible, we may then inquire, lastly, "How have the germs got into the now extravascular tooth-pulp?" For if present at the time of injury they would surely have set up early putrefaction. I think we may safely assume that they must either have been conveyed from a distance by means of the circulation, or have worked their way in from the neighbourhood through contiguous structures. Against the circulatory hypothesis is the fact (assumed at the commencement) that the circulation has been intercepted at the apex of the root.

But it would be in accordance with what takes place in other parts of the body to suppose that fresh capillary vessels would develop up to the margin of the dead tissue, and it would be possible for such vessels to convey septic germs to the pulp at any time when the individual might be the subject of an infective inflammation in some other part of his body, or even when he had, by the stomach and perhaps by the lungs, imbibed an unusually large quantity of such septic agents. The alternative hypothesis, that the germs might have got in through contiguous structures, seems not altogether unreasonable either, when we consider that the alveolar attachments of such a tooth as we have been supposing might not be very close, and that a very little exudation on the surface of the root would afford a nidus for the growth and infection of bacteria, penetrating in from the mouth and afterwards making their way down to the apical foramen, or perhaps through the cementum and dentine to the pulp.

Such cases and the questions they involve are well worth working out; but, whatever may be their explanation, the practical treatment of alveolar abscess on antiseptic principles has proved, I believe, so highly successful as to afford very valuable corroboration of the truth of the Listerian doctrine. It is true you do not use the spray, but the rubber dam takes its place. The methods are different, but the principles are the same.

And now I am afraid it is more than time that I brought my remarks to an end. I will do so with the expression of the gratitude which, I feel, the Medical Profession owes to those who have raised Dental Surgery to the high scientific position it now occupies, and especially do my thoughts turn to my former respected teacher and kind friend, Mr. James Salter.

Let us follow the example of all honest and truth-seeking workers, while, with no selfish aims, we too work for the public weal.

## IDENTIFICATION BY DENTISTRY.

The following incidents are recorded by the *Ohio State Journal of Dental Science*:—Some of our more aged readers can remember the Webster-Parkman murder trial. In a fit of anger, and probably without intending it, Dr. Webster, a Professor of Chemistry in Harvard University, killed Dr. Parkman. To conceal the murder, he burned the body. A lower artificial denture was found in the fireplace. Dr. Keep was Dr. Parkman's dentist. He carefully kept all his models in numbered "pigeon-holes," which were entered in a ledger. By referring to his books, he at once found the model of Dr. P.'s lower jaw, and, though it was of a very peculiar form, the plate exactly fitted it.

In a late ocean horror, a young man identified the remains of his mother, by comparing the mouth with the family dentist's record of the fillings in the teeth. The identification was complete, although otherwise the remains were mutilated quite beyond recognition.

Over a dozen years ago we filled some teeth for a good looking young man. A corner had been broken off a central incisor. He insisted on having the form fully restored, so we built out the gold as nicely as we could. He was very proud of it, and as in both mirth and anger he freely exposed his upper teeth, he had no trouble in displaying his gold. In a few weeks he went into a house where a woman was alone, and having an axe in his hand he told her to sit still and remain quiet, or he would split her head. His angry grin displayed the gold, which she noticed; and though he got away with two thousand dollars in greenbacks, he was hunted down by the police, who searched for the "golden tooth," giving him no time even to spend the money. He had sought refuge in an obscure village, away from all line of travel, yet he could not conceal the gold, and was arrested accordingly.

Another case sounds to us like an almost forgotten dream, as it is referred to by one of our exchanges. An excise man, named O'Connor, called on his friends, Mr. and Mrs. Manning. They killed him for his money, and buried him in quicklime, under the stone floor of their kitchen. When the body was found, the lime had destroyed the features, quite beyond the point of possible recognition. An artificial denture was found in the mouth of the victim, which exactly fitted the model of O'Connor's mouth, which had been carefully preserved by the dentist. On this testimony the Manning's were hanged.

If any of our readers can tell us where and when this case occurred, we will be thankful for the information.

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## ODONTOLOGICAL SOCIETY.

The ordinary monthly meeting of this Society was held on June 9th, Mr. J. Smith Turner, President, in the Chair.

Mr. Harding (Shrewsbury) mentioned the circumstances of a case of a child three years of age having fallen and dislocated the upper central incisor teeth, one of them being driven up out of sight. The teeth were replaced, one tooth becoming fixed and the latter one suppurating. Recently he had seen the child, and found that the succeeding permanent teeth had erupted and apparently sustained no injury.

Dr. Elliott wished to know if any of the members could give him any facts in their experience with regard to hypræsthesia. A lady patient of his, aged about 50 years, had a right upper lateral which became sensitive over the whole surface of the enamel, so much so that it became exceedingly difficult for her to drink or to take food. He had made several applications of different things, but with only very temporary success. He had, much to his regret, finally to extract the pulp.

Dr. Elliott next exhibited some improved nerve extractors made by himself from pianoforte wire, and some instruments manufactured from aluminium bronze.

Dr. Elliot also gave the results of his experiments upon certain batteries, with the object of obtaining, if possible, what was the best kind to use for the electric mallet. His results showed that the "Lund" was the most useful for the purpose; and it was made considerably more useful when used, as he had been doing, with two carbons perforated.

Mr. S. Bennett said he used one of the Gutta Percha Company's batteries, the same kind as used very largely for blasting purposes. That kind of battery he had found to work for the last two years without requiring any attention.

Dr. Elliott said that batteries were of course very much like steam engines, and when very much used required fresh supplies; but he had kept a record for the past twelve months of the time he used the electric mallet, and he found that time to be, on an average, one hour and twenty minutes a day. He had taken that trouble with the object of discovering the best battery for the purpose, and the one spoken of by himself was the one best adapted for working the mallet in a satisfactory manner.

Mr. W. H. Coffin recommended the use of a Leclanché form of battery, made of the agglomerated blocks about four feet long. Such a size, placed in drain pipes and in the corners of the room, requiring simply chloride of ammonium to work them, would run a mallet for years. He was not in a position to state the mode of preparation of the carbon for the large batteries, as the patent for the preparation of the same would be issued in the course of a few weeks.

Mr. Parkinson unveiled, and, on behalf of a few friends, presented to the Society, a portrait in oil of Mr. John Tomes, F.R.S., &c.

Mr. Oakley Coles read a Paper on "The Maintenance of Health amongst the Members of the Dental Profession." He remarked that the practice of Dental Surgery, as carried on at the present day, was undoubtedly very injurious to health. As a rule the Dentist worked in a room in which the atmosphere was imperfectly changed during the day, his work necessitated his body being kept in a cramped and awkward position. He was always subject to the risk of having to take the breath of a patient, either in a robust or diseased state of health. He often had to cause positive pain and discomfort to his patient by the practice of his profession, which was to all men more or less a source of great anxiety. His work gave him a very limited area of vision, and in his practice it was very often necessary to throw reflected light upon the part to be operated upon. Another thing to be considered was the temper of the dentist as well as that of the patient to be dealt with.

Mr. O. Coles then proceeded to give some rules which he thought should be observed by those who practised Dental Surgery. The operating room should be as large and lofty as could be obtained. The floor of the room should be covered with parquet or such like material, and the walls varnished, so as to keep, as far possible, the vapours of drugs or the dust from adhering. A Tobin's ventilator should be provided as near the chair as possible, so as to allow a constant change of air round about it. A fire should be kept alight in the grate as long as it was possible to make an excuse for so doing, and when that was out of the question a lamp of some kind should be burnt, so as to carry away the bad air. One window in a room only should be used; the others should be closed up, so as to keep out the light.

If mirrors are used, they should be placed upon the shutter backs.

A music or Lyons stool should be used, as it gives a great deal of rest to the tired operator. A slight rest for one leg would also be advisable, if it could be obtained.

Under the many trying circumstances of professional work, was it surprising that some of their fellow workers broke down, and often, when in bed, slept without any refreshment from that sleep, consequent upon the over-work and anxieties of the day? Mr. Coles thought it would be sad and painful to mention the names of the many men who had failed and died simply from over-work. Some of them could stand the work for an ordinary professional lifetime, but even then the failing sight and morbid digestion would show itself.

Considerable discussion followed the reading of the paper, after which the Society adjourned till the 3rd of November.

## BRITISH DENTAL ASSOCIATION.

### ANNUAL MEETING OF EASTERN COUNTIES' BRANCH.

The Annual Meeting of this branch of the Association was held in Cambridge on the 16th and 17th of June. During the afternoon of the former day clinics were given by Dr. Cunningham and Dr. St. G. Elliott; and the Council held a meeting. On the second day the work of the meeting began shortly after ten o'clock, Mr. Alfred Jones, President, in the chair.

It was decided to hold the next meeting in Bedford, and Mr. Wentworth White was chosen President-elect. Mr. W. O. Rhodes was appointed Secretary, in the place of Dr. Cunningham, resigned.

### DENTAL SURGEONS AT HOSPITALS.

A report was presented as to correspondence with about twenty of the principal hospitals in the eastern counties, suggesting that a qualified Dental Surgeon should be attached to the medical staff of all general hospitals and dispensaries. The only satisfactory communication received was from the Bedford General Infirmary, which for many years had had a qualified Dental Surgeon attached to it, as has also the North Cambridge Cottage Hospital. The managing board of the West Norfolk and Lynn Hospital had shown every desire to receive the application, but had not been able to do so; three other Associations had merely acknowledged the receipt of the communications, while the others, including Addenbrooke's Hospital, had made no official recognition of it whatever.

The Secretary, Dr. Cunningham, in his report, commented upon this being the first occasion of their meeting formally as a branch of the British Dental Association. He reported continual and steady progress during the year, several new members having been elected to the British Dental Association and three to the Eastern Counties' Branch. It was with feelings of the very deepest regret that they had to report their first loss by death, in the person of their much regretted brother, Alfred Rogers, one of the original members of the Eastern Counties' Dental Association.

The last Annual Meeting of the parent Association at Plymouth was a great success, and was attended by their President (Mr. Fen Cole) and others. Allusion was also made in the report to the conferring of an hon. degree (LL.D.), at the tercentenary celebration of Edinburgh University, upon Dr. John Smith, President-elect of the British Dental Association, and to the proposition to establish a School of Dentistry at Owen's College, Manchester.

A number of papers were then read, as follows :—By Mr. J. B. Bridgeman, L.D.S.I., "Notes on a Case of Irregularity;" by Mr. W. A. Rhodes, L.D.S.I., "The Mouth of the Insane;" by Mr. Alfred Jones, jun., L.D.S.I., "A Method of Pivoting;" and by Dr. George Cunningham, "On Porcelain Crowns." An animated discussion took place upon several of the papers.

The Association then adjourned to attend the President's luncheon.

In a room adjoining the Anatomy Theatre, Messrs. C. Ash and Sons, and the Dental Manufacturing Company, had an excellent show of new inventions, electric and other special dental instruments.

The President, in his address, gave a sketch of the art of Dentistry as practised in Greece and Rome. On turning to this study, he said one could not help being struck with the silence preserved on matters of Dentistry by nearly all the Greek writers of the so-called classical period. From Herodotus to Aristotle hardly any mention was found of the art. Aristotle had given them much information, of which some was the basis of their principles to-day, but he fell into some curious errors. The President mentioned the instruments described as belonging to the "tooth doctor," the extractor, the scraper, the woulalifter or cutter, and commented upon the clumsiness of this apparatus. It would really seem that teeth were cleansed by scraping and rarely removed ; that there were no false teeth even attempted, and no stopping was in use. On turning to the Romans, they found that more attention was paid to the Dental Art, which was consequently in a state of higher development; this would arise from the necessity to cope with the increase of dental disease, contracted by the debauchery and licentiousness of Imperial Rome. The method of extraction was similar to that of the Greeks, but the Romans were skilled in their preparation of dentrifrice, and some mention is made of artifical teeth. The treatment of decayed and aching teeth was chiefly medicinal, applied to the tooth itself, or through the ears, or by inhaling. Alluding to many of the absurdities practised, he said he thought these justified the statement that the science of Dentistry was not so advanced in the palmiest days of Greece and Rome as was generally supposed, and was by no means on a level with the science and philosophy of those forerunners of the civilized world.

## JOURNALISTIC SUMMARY.

### THE DENTAL REGISTER *(June, CINCINNATI).*

"PROFESSIONAL DUTIES AND PRACTICAL SUGGESTIONS," by Dr. Charles E. Francis. They who fill our chairs are not so greatly favored as they who are blessed with perfect dentures. Children are brought to us who, even before three summers of their lives are completed, have experienced the tortures of odontalgia, and their teeth are found defective at many points. The writer, having enumerated several other conditions which the Dentist daily meets with, says, notwithstanding the many teachings and admonitions on the part of our fraternity, the majority of the people in all communities are habitually careless or negligent in the care of their masticators ; and, as a consequence, comparatively few individuals witness the anniversary of their twentieth year with perfect dentures, while many lose half their complement before this period of life is reached. For the management of the many cases that come within the province of our speciality no fixed rule can be stated that will answer for them all, yet certain principles exist which, if readily understood and intelligently applied, would greatly aid us in our efforts to equal each occasion, and encourage us to hope for good results. The chief duty we owe our patients is to impress upon their minds the necessity of keeping their masticators in a condition of cleanliness. Parents should be made to comprehend the importance of giving their children's teeth attention at an early age, and of keeping their deciduous teeth preserved until the time for their successors to appear. Our patients should be taught the importance of having their teeth examined at somewhat frequent intervals, and before caries or calculus can have caused much mischief. The "stitch-in-time" principle is as applicable to the teeth as to anything else.

"PROFESSIONAL ATTAINMENTS AND POPULAR NEEDS," by S. B. Palmer, M.D.S., Syracuse. To-day it is well known that teeth may be preserved with other fillings than gold; that the back teeth in particular may thus be filled with no great detriment to external appearances; and further, that gold fillings may be inserted by the young graduate who is in need of practice at less cost than the established practitioner would care to operate for. Unfortunately for the young Dentist and the needy patient, there is a professional gulf which hinders the public from receiving benefits which otherwise might be honorably bestowed. I say *honorably*, because the rendering of services below the standard in a given locality is not considered creditable or professional, even though the demand be just and the services rendered a public necessity. Any Dentist in good standing who operates for patients that have left other offices on account of high prices loses reputation by the act. As the demand for cheaper dentistry increases, and the possibilities to furnish it become practicable, we will see more and more violations of the code of ethics by those entitled to honorable standing in the profession. Considering that there is a large class of people below the present reach and benefits of dentistry, also that there are Dentists ready and anxious to bestow such benefits, does it not show that there is something wrong in the sentiment which prevents the consummation of this worthy object? There is an excuse for the present condition of things. The graduate honors the teachings of his instructor; he starts high and aims high; skill and talent will command their reward, and thus there is proper stimulus to good work; and we have not a word to utter against the highest practice of dentistry. As we look at the other extreme, it is plain to be seen that cheap dentistry has no professional recognition or sanction; the *fees* demanded, rather than the work performed, become the standard of respectability. So long as the profession maintains, or asserts, the line of respectability upon other merits than the quality of service rendered, so long will there be recorded dishonorable acts and violations of the code. It is sad when an intelligent patient is compelled, from adverse circumstances, to seek the services of a lower priced operator. His very inquiries give him the reputation of a "dental shopper," and if he succeeds in obtaining a sitting in an honorable chair, he feels himself in part a charity patient, or is requested not to make the transaction public. If he consults advertisements and finds the Dentist suited to his means, it would be strange indeed if he had not already been warned that this man was a "Cheap John."

"ADAPTING PARTIAL CROWNS TO ROOTS OF TEETH," by Dr. Geo. W. Smith. The failure in treating and filling successfully the natural root was the greatest obstacle to be overcome in the adoption of a method which avoided plate work ; but the rapid strides made by our ever-advancing profession have at last overcome these obstacles, and by the improvements made we may now restore broken down crowns, by setting gold bands and porcelain crowns on roots almost entirely destroyed by caries. The pulp cavity having been treated until it is free from all obnoxious and fermenting gases, may then be enlarged with suitable instruments to within one-third of the apex, to receive the pivot. It has been my practice in the crown which I have originated, to cut the root short to the gum, if not slightly under the free margin on the labial surface, while on the palatine I leave it projecting slightly, if possible. I then fill the upper third of the root with Fosseline and surgeon's cotton. I take a small portion of the fibre, tease it on glass, mix it with the cement, and with small nerve instruments, I carry it to the apical foramen, completely closing it. The cotton serves to carry the cement to the desired point, and when packed in the root, will set perfectly hard, and completely exclude any egress from the canal through the apex, which is the ultimatum in all root filling. I then take a cast from the mouth, followed by articulation, after which I select a plain plate tooth, with shade to suit those with which it is to be associated, and grind to suit the prepared root. I now select the pivot of gold or platinum, the end of which I flatten, punch holes to suit the pins in the artificial crown, and press the end on as backing. I invest this, and solder the wire to the pins. If the wire is not quite shaped to suit the hole in the root, it can easily be adjusted. Place the pivot and crown in position, and regulate the contour and articulation. Now take sheet tin, press around the palatine surface, while the tooth is in position; let the tin cover the root, also the palatine surface of the tooth. This will give the outline of pattern, from which the gold band may be cut and shaped to the root and crown; secure the band with "wax resin" and remove altogether. Invest and solder. When polished, the root, together with the crown, should be sponged off with alcohol, the mouth kept dry with bibulous paper or a napkin, until the cement is prepared for the pivot. Mix enough of the Fosseline to fill the root, which should be put on the pivot and band, and then carry them up in position and hold firmly until it hardens. This crown is not only artistic, but serviceable; and when set gives entire satisfaction.

"New Remedies," by Dr. Wm. A. Pease. Having referred to the unsatisfactory results in the treatment of teeth from which the pulps have been more or less perfectly removed, the writer says:—The means I have found the most effective, which are believed to be valuable and novel, consist of iod. potass et aqua calcis; both strong, the strength to be determined by location, patient, and what is required. Where there is much tissue to be destroyed, the action of the agent may be facilitated by probing and lacerating it with broaches and pumping the solution into the substance of it, or by letting it be absorbed by gravitation or capillary attraction. This will be chiefly necessary beyond the curve of the roots of the molars. Several applications may be made when necessary, until the tissue has become saponified, when it can generally be washed out by a syringe being more or less soluble, or by arming a broach with sufficient cotton wet in the solution and then passing it down the canal, twirling it around and removing it. Sometimes a broach made from a splint of the bamboo, which is very tough and flexible, is better. Then, if any remain, it is impregnated with potash, saponified, inert, and a most uncongenial *nidus* for parasites, while the iodine would evaporate and gently stimulate the absorbents beyond the foramen. This method leaves the dentine clean and white, and the passages leading to the crusta petrosa are not dark as when they are infiltrated with carbolic acid. As an adjuvant to them the bromide of potass may be freely used of any strength desirable, as it is the best sedative of irritated mucus membrane and of the nerves, which terminate immediately beneath it, we have.

### DENTAL COSMOS (*June, PHILADELPHIA*).

"EMBRYOLOGY WITH SPECIAL REFERENCE TO THE TEETH AND CONTIGUOUS PARTS," by Dr. J. L. Williams, and "DENTAL MINISTRATIONS TO CHILDREN," by Dr. A. Howard Thompson. An epitome of these two articles will be given in the next number of the DENTAL RECORD.

Among incidents of office practice mentioned at the March Meeting of the New York Odontological Society, the subject of GOLD CROWNS was discussed: Dr. Kingsley said:—I have been making gold crowns for a good many years, and to my mind the method described has one serious fault,—the same fault that I have found with the crown made by Dr. Rynear. My method is to take a strip of gold as wide as I want the crown in length, make it into a ring or ferrule, and fit it to the natural stump. I do not find it necessary to take an impression and make a cast. This band or ferrule can be soldered and completed ordinarily within ten minutes after beginning the operation. It is fitted so closely, that when it is driven on the stump it will not impinge at one or two points only, but will fit accurately everywhere. I believe that such a perfect adaptation is a *sine qua non* essential to success. The absolute certainty that a band made in this way will fit the stump perfectly is seen by looking at it directly with the eye. When the band is fitted and pushed on to the stump, the next step is to take a small piece of wax and place it inside of the ring; then take a bite, remove the ring and wax, and make a little plaster articulation. Carve the wax up so that it shall present a grinding surface that will articulate and occlude with the opposing teeth just as nicely as if it were a natural tooth. Then make a die and swage up the cap, or grinding face of the tooth. I have never found it necessary to alter that cap in order to make it antagonize correctly with the opposing teeth. The cap being the only thing to strike up, one die only is needed. The ring being long enough to reach the grinding surface, a simple cap will meet it. The cap is attached by soldering. When the crown comes to be placed upon the stump it is certain to fit. In almost every case where I have applied gold crowns the diameter of the stump was less than that of the natural tooth which belonged to it, and I could not possibly strike up a crown from one piece that would fit the neck properly on a die that is larger toward the grinding end than at the neck. My objection to the method of striking up entire crowns is that there is no absolute certainty of the accuracy of the adaptation to the stump when the inside cannot be scrutinized; and, secondly, that the true form of a crown cannot be reached in this way, because the neck should be the smallest part.

President Jarvie. How could you get such a ring off the tooth if it was narrower at the neck than at the end of the crown?

Dr. Kingsley. Because it is only the ring, not the gold crown, that is narrower; that is made the size or the diameter of the stump, which is *per see* of less diameter than the crown at the grinding end. If that stump were very long, and so shaped that I could not get the ring off, I should trim it so that it would come off. It must fit closely, or sooner or later there will be trouble. When thus fitted it does not require much additional support. When I use oxyphosphate I drill a small hole in the grinding surface of the gold crown, so as to allow the oxyphosphate to ooze out when the crown is driven on. My criticism of Dr. Jarvie's method is that I cannot see how it is possible to swage up a piece of gold to fit around the neck of a tooth, even if the neck were not of less diameter than the bulk of the crown, and be sure of having a perfect fit. The gold, as we all know, would have to be crimped in about the neck, and with the dies as described it is very difficult to pucker gold into such a position.

The CHEMISTRY OF DISENFECTANTS AND ANTISEPTICS was the subject of a communication by Professor Charles Mayr.

There is also a report of the November Meeting of the First District Dental Society of the State of New York.

### INDEPENDENT PRACTITIONER *(June, NEW YORK).*

"FERMENTATION IN THE HUMAN MOUTH," by Dr. W. D. Miller, is continued from the previous number.

"DENTAL EDUCATION," by Dr. B. M. Hopkinson. The writer deals with certain irregularities practised by some American Dental Colleges, particularly with regard to the faulty general education of many of the graduates.

"BROMIDE OF ETHYL AS AN ANÆSTHETIC," by Dr. G. E. Curtis. He considers Bromide of Ethyl the most valuable anæsthetic for use in the dental profession, at least in many operations. The writer says:—On the 25th day of March, 1884, I first administered it, my patient being a robust servant-girl of seventeen years. Observing the directions of Dr. Chisholm as closely as possible, I proceeded, with the following results: Folding a thick towel in the form of a small cone with a closed apex, I placed between the folds of the towel a piece of newspaper, which made the cone nearly air-tight, then instructed my patient how to make long inspirations, and making her go through the process in advance, informed her she must do this, even though she might feel somewhat stifled, and gave her confidence by an assurance that a few inspirations would put her to sleep. Into this towel cone I poured about one drachm of the bromide of ethyl, and I immediately inverted the inhaler over the mouth and nose of my patient, holding the edges firmly down to the face. The first one or two inhalations seemed to strangle her, but the timely movement of my assistant prevented any interruption, and in about thirty seconds I removed the inhaler and was ready to operate. I found the muscles were not relaxed and the jaws firmly closed, though the conjunctiva did not respond to the touch, which delayed matters about thirty seconds. After extracting the first tooth I waited about half a minute to note the result of my drug, and then removed the second tooth. At the end of about two minutes my patient showed signs of returning consciousness, and in a half minute more awoke almost as suddenly and completely as from ordinary sleep, without any of the symptoms of nausea that generally attend the administration of other anæsthetics, and personally declared she felt perfectly well, and had had no knowledge of what happened during the process of ethylization.

The face of the patient was considerably flushed while under its influence, and the muscles and veins of the neck were distended. The increased action of the pulse which was noticed, however, soon returned to its normal state.

There is a portion of a report of the Annual Meeting of the Mississippi Valley Dental Association, held in March last. A discussion was opened upon antiseptic agents—peroxide of hydrogen, menthol, salicylic acid, and other agents.

An abstract is given of a paper read before the New York

Odontological Society, by Dr. J. Smith Dodge, on the SPHEROIDAL TENDENCY OF AMALGAM—that amalgam fillings, which change shape after becoming solid, do so from the tendency of amalgam to assume the form of a sphere.

The May Meeting of the Chicago Dental Society and the Annual Meeting of the Southern Dental Association are also reported.

### ITEMS OF INTEREST *(June, Philadelphia).*

A CASE OF LONG-STANDING NEURALGIA is reported by Dr. T. W. Brophy. The patient was already about 48 years of age and had lost her upper teeth twenty-five years before. It was eventually found that the source of her trouble was a bicuspid tooth impacted lengthwise in the maxillary bone with the apex well into the antrum. With some difficulty the tooth was removed, and, after the effects of the operation had passed away, the patient, for the first time in four years, had perfect immunity from pain. Three months subsequently, however, pain of the same character was felt on the opposite side, and another operation was performed with the same result. No neuralgic pain has been felt since, though the opening in the antrum has not closed.

THE RUBBER DAM, with a few simple instructions as to its application is the subject of a short article.

ROBINSON'S FIBROUS AND TEXTILE FILLING FOR TEETH. This was the subject of a paper read before the Central Illinois Dental Society, by Dr. Truman W. Brophy. He considers this material possesses qualities not to be found in any other with which he is acquainted; yet he does not believe it to be equal with gold. He has found it of the greatest use in filling children's teeth previous to about the twelfth year; and also in approximal cavities which dip down beneath the gum, and thereby make an adjustment of the rubber dam difficult and painful. The pluggers should be deeply serrated and the filling malleted.

THE BROWN OR GREEN STAIN UPON THE TEETH, and BRAIN FORCE AND CAPACITY, are the subjects of Editorial Articles.

# EXAMINATION QUESTIONS.

## ROYAL COLLEGE OF SURGEONS OF ENGLAND.

The following Questions were given to Candidates at the Examination for Diploma in Dental Surgery, on June 17:—

### ANATOMY AND PHYSIOLOGY.

1. Give the course and branches of the Lingual Artery.

2. Describe the act of Deglutition, and mention the agents by which its successive stages are performed.

### SURGERY AND PATHOLOGY.

1. What Cysts occur in the Floor of the Mouth? Give their diagnosis and treatment.

2. What are the natural processes by which Hæmorrhage is arrested? What would you do in Bleeding from the Mouth?

### DENTAL ANATOMY AND PHYSIOLOGY.

1. Mention the general characters of the Teeth and Jaws of Rodents, describing any peculiarities of form and structure met with in their Incisor and Molar Teeth.

2. Give the minute anatomy of an Enamel Organ, tracing its several component parts to their ultimate development.

3. Describe the Changes of Form which take place in the Jaws from the period of birth to that of advanced age, explaining the conditions which lead to the protrusion of the chin and shortening of the face in old people.

### DENTAL SURGERY AND PATHOLOGY.

1. Enumerate the conditions which may give rise to partial or complete Closure of the Jaws. Give the points important for diagnosis, and the treatment.

2. In the treatment of Diseased or Exposed Pulps, what symptoms would indicate devitalization, and what preservation of the pulp? What conditions conduce to the success or failure of the latter operation?

3. What are the physical peculiarities of Cohesive, Non-cohesive and Sponge Golds? What are their special merits and demerits as filling-materials, and how may they severally be used to the best advantage?

## PASS LIST.

### ROYAL COLLEGE OF SURGEONS OF ENGLAND.

The following is a list of Candidates who passed the Examination in Dental Surgery on the 17th, 18th and 19th of June, 1884:—Crank, Peter, Middlesex Hospital; Norris, Edward Lewington, Middlesex Hospital; Saunders, Herbert Sedgwick, Charing Cross Hospital; Skipp, George Nash, Middlesex Hospital; Stainer, Robert William, Charing Cross Hospital; Trott, George William, Middlesex Hospital.

Three candidates were referred.

Mr. W. B. Paterson, M.R.C.S., L.D.S., passed the Final Examination for the Diploma of Fellow of the College, held on May 29th, 30th and 31st.

## Editorial.

### THE MEDICAL ACT AMENDMENT BILL.

THE Medical Act Amendment Bill, which passed the House of Lords last session, again passed the Upper House on April the 4th, and it was read a second time by the House of Commons on the 26th of June. It has yet to pass through Committee, in which stage, perhaps, some of the several amendments proposed may be made. Yet there is now little doubt that the long-desired reform which this Bill provides will be obtained during the present session of Parliament.

Though this Bill does not materially affect the Dental Profession, there are certain clauses which give rise to anticipations. Among the important items of the Bill, it is provided that no person can be registered as a medical practitioner unless he have passed an examination before a Medical Board—one such Board to be appointed by the universities and certain of the medical corporations of, and for each of the three sections of the United Kingdom.

This license of a Medical Board will be essential to registration, and the degrees of universities and corporations will be regarded as additional qualifications only. Though the granting of Dental licenses after examination, as hitherto, is not specially interdicted, yet provision is made to bring into force section 28 of the Dentists' Act, 1878. This section provides for, with the sanction of the Privy Council, the formation of an Examining Board for Dentists in each section of the United Kingdom analogous to the Medical Boards. It is not likely that the Privy Council will be moved in that direction unless the voice of the Dental Profession is raised in supplication.

Another item is the formation of a new Medical Council with increased powers. How will the new Council exercise those powers with regard to Dental matters? Will Dental Education be augmented or modified? Will Dental Examinations be influenced, and will there be any interference with the *sine curriculo* examinations as hitherto held?

There is another question:—Candidates who may wish to take a Medical or a Surgical qualification in addition to a L.D.S. degree will not have any claim to registration in the Medical Register, unless they pass the examination of a Divisional Board. Consequently, will not such students pass the Divisional Board, rather than go in for the M.R.C.S. &c. in addition to the L.D.S.?

## GOSSIP.

Mr. Arthur Crocker, L.D.S.I., has been appointed Dental Surgeon to the Halifax Infirmary.

Regarding the origin of wheat, Mr. Grant Allan states:—Wheat ranks by descent as a degenerate and degraded lily.

The Students' Society of the Dental Hospital of London will hold a Conversazione at 8 o'clock on Monday, the 14th inst., at 40, Leicester Square.

Dr. Robert Lee says we cannot avoid the conclusion that when the mother is infected with syphilis in the ordinary way—that is, by direct inoculation—the effect upon the fœtus is very serious—that is, very much more serious than when infection has followed conception.

A case of death during the administration of bichloride of methylene is recorded in the *Lancet*.

THE

DENTAL RECORD.

VOL. IV. AUGUST 1, 1884. No. 8.

# AN IMPROVED METHOD OF AFFIXING ARTIFICIAL TOOTH CROWNS TO NATURAL ROOTS.

BY A. H. BEST, M.D., L.D.S.I.

## PART II.

I WILL now proceed to describe a method of attaching the tooth crown, which is found peculiarly adaptable in certain cases, especially in those manifesting the condition technically known as a "close bite." While strictly applicable to the eight or ten anterior teeth, this process may also be occasionally employed with advantage for molars.

The tooth crown used in this instance is an ordinary plate tooth with pins, which is backed up with platinum and soldered with gold. The backing is the special feature on which the practicability of the design depends; it is accordingly to be made to suit the particular case for which each tooth crown is intended. In those cases of the six anterior teeth where the condition commonly termed mechanical abrasion exists in a marked degree—so that we may find, *ex. gr.*, the superior centrals, almost or entirely worn away, leaving the roots quite free and healthy, but in which the continued occlusion of the opposing teeth precludes the possibility of adjusting crowns by the ordinary methods—the present process will be found of great service. The backing is so adjusted in these peculiar cases, that a metallic capping is provided for the exposed end of the root, thus securing it against further wearing down, while a thoroughly satisfactory masticating surface is provided, as well as a solid attachment for a crown.

In cases that do not present the extreme condition indicated by the foregoing, but where the "bite" is still too close to admit the use of the crowns of ordinary construction, the requirements may be effectually met by backing a flat plate tooth with a piece of platinum plate, being cautious to secure the feature referred to above.

The strip of platinum constituting the backing should be as broad as the width of the tooth crown and root to which it is to be attached, will permit. Having been perforated for the pins, this backing is bent at a right angle; it is then soldered to the crown in the usual manner, the turned off portion of the backing being as near as possible to the cervical end of the crown, and in a position favoring its being secured to the natural root. In order to insure strength care should be taken to flow the solder well into the angle and over the entire backing.

The root is next prepared, and the nerve canal opened up to the extent desired. The backing is now to be perforated to receive the pivot. A very practical way of locating this aperture consists in adjusting in the root a trial pivot, exactly in the position which the permanent one is intended to occupy, the trial one being short enough to allow of the adjustment of the crown. The extremity of this short pivot may be touched with vermillion mixed with oil, or some other color, even ink will do; or the lower surface of the backing may be thinly coated with wax. The tooth being then placed into position, a very satisfactory marking is obtained, and the perforation may then be made to fit the diameter of the pivot to be used. As thus fitted with perforated backing, the crown somewhat resemble the accompanying figure.

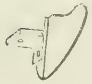
FIG. 1.

After being perforated, it is tried in; some facility of adjustment in the anterior or labial aspect is attainable by slightly enlarging the opening through which the pivot is to pass, in that direction only which will effect the desired adjustment. In this connection, it is worth while to remark that cautious bending or twisting of the backing offers an additional means of delicate adjustment, supplementary to the enlargement of the aperture as just described. But if the perforation has been carefully located according to the directions given above, there will seldom be any necessity for these expedients.

In cases of bicuspids and molars, when the bite is not so close as to necessitate the first arrangement of the backing, it is advisable to back the tooth with a **T** shaped piece, made out of a single strip, thus **U**. This form permits the loop to extend from the centre of the tooth, thus greatly enhancing the strength of the adjusted crown. The tooth when backed would present the appearance of the annexed cut.

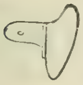

FIG. 2.

The same kind of a wire pivot is used with these crowns as in the first method, and the same precautions should be taken to secure it in the root. The only difference lies in the means of securing the crown to the pivot, which in this case consist of two nuts, one below, the other above the backing loop. The wire being one continuous thread, these nuts may be run up or down until the crown is in the desired position, and may then be tightened, when it is held securely. The packing of amalgam is effected in the usual manner, all possible care being of course exercised to get the cement down into the root between the threads, and to absorb all the mercury possible, so as to expedite hardening to the extent of our ability. The amalgam should be built up around the nuts so as to secure them in position, and in cases where it is not practical for the nuts to extend beyond the end of the root, as where there is much mechanical abrasion, &c., it is desirable to countersink the backing, so as to let the nut into the root, as it were; space being thus afforded to fill with amalgam and secure the device.

In using tooth crowns in this manner where the necessity for a porcelain face is apparent, and yet where a surface for occlusion and mastication is to be provided, as in bicuspids and molars, the nuts and screw pivot should be so arranged as to come as near the centre of the structure as possible, thus permitting the amalgam which forms in this case the grinding surface to thoroughly envelop the entire mechanism.

## REVIEW OF BOOKS.

Injuries and Diseases of Jaws. By Christopher Heath, F.R.C.S., &c. Third Edition. London: J. and A. Churchill.

When the first edition of this work was published in 1868 it was at once received as a valuable contribution to the medical literature of the day, containing as it did reliable records of the treatment, by operation and otherwise, of various injuries and diseases of the jaws not before so thoroughly illustrated or commented on. Having taken the Jacksonian Prize of the R.C.S. of England in 1867, it appeared under the most favourable circumstances, and a second edition was in 1872 demanded, which added to the reputation of the author, and increased the value of the book. Now, after an interval of twelve years, a third edition is presented to the public, in which the personal experience of the author has added considerably to the subject matter originally brought forward, and, as he states in his preface, views previously expressed have been modified, especially with regard to the pathology and treatment of multilocular cysts of the lower jaw.

In this connection the author adopts the views of Mr. Ede, who believes " that, so far from multilocular cysts having a dental origin, they are produced by an ingrowth of the epithelium of the gums. They have frequently followed some form of injury, irritation by decayed teeth, or long-continued inflammation, which has induced an increased supply of blood to the parts. . . . . Their comparative innocence is probably explained by the bony capsule forming their boundary, by their low degree of vascularity, and by the remarkable tendency of the epithelial cells composing them to undergo degenerative changes. . . . . Under the term 'multilocular cystic epithelial tumour' we may include the old multilocular cysts and cystic sarcomata, both having a distinct tendency to be reproduced locally, and in certain cases to become disseminated."

A chapter on "Diseases of the Temporo-maxillary Articulation" has been added to this edition. Notwithstanding its exposed position, which would seem to render it liable to inflammation, particularly from local causes, it is remarkable, says the author, that acute disease of the temporo-maxillary joint is hardly recorded. He thinks the explanation is to be found in the fact that it is often confounded with acute affections of the ear, and that mischief beginning in the articulation may induce purulent discharge from the meatus in children.

To the members of the Dental profession the whole of the contents of this work are more or less interesting, and it is pleasing to find that the author has laid himself under obligations to so many contributors emanating from this body of practitioners. Hardly a page can be perused that does not contain familiar names, and as the cases are very fully illustrated, and the various authors have in every available instance been consulted, a great deal of original matter appears that will not be found in either previous edition. From the first chapter, on "Fracture of the Lower Jaw," to the twenty-eighth, "Deformities of the Jaws," there is hardly a paragraph that might not be quoted with advantage in a Dental journal; but the reader is referred to its varied contents, feeling convinced that the whole volume constitutes one of those text-books that cannot safely be left out of the Dental Surgeon's library. Appended to the work will be found the particulars of some well recorded cases, all of which so thoroughly illustrate the varied contents described in these twenty-eight chapters that the matter forms an excellent support in confirmation of the author's opinions and in further illustration of those operations that are dwelt upon in the body of the work. Altogether, the third edition has extended its letterpress about fifty pages, with the addition of forty well-executed illustrations.

PHOSPHOR.

## FERMENTATION IN THE HUMAN MOUTH.

### THE INFLUENCE OF ANTISEPTICS, FILLING MATERIALS, &c., UPON THE FUNGI OF DENTAL CARIES.

By Dr. W. D. Miller, Berlin.

*(Continued from page 262.)*

Having established upon an experimental and scientific basis the fact that caries of the teeth is, to a certain extent, the direct result of the action of ferment acid or acids* upon the tissue of the tooth, followed, particularly in the case of the dentine, by the action of the ferment organisms themselves upon the decalcified tissue, it becomes a matter of the first importance to determine, first, by what means may we counteract the action of the acids or prevent their production; second, by what means we may save the already decalcified dentine from complete destruction.

Evidently there are three methods by which the desired end may be partially obtained:

1. By repeated, thorough, systematic cleansing of the oral cavity and the teeth, we may so far reduce the amount of fermentable substances in the mouth and the number of ferment organisms,

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* The chief work in the production of caries is performed by lactic acid; other acids are only auxiliary factors.

as to materially diminish the production of acid. This is so self-evident that it needs no further comment.

2. By the repeated application of alkaline substances we may, to a certain extent, neutralize the acids before they have acted upon the teeth to any considerable degree.

3. By a proper and intelligent use of antiseptics we may destroy the organisms themselves, or at least render them inactive. It is this method which is especially applicable in the second stage of dental caries (*i.e.*, the stage which follows the decalcification), and to which we will here give exclusive attention. We must, however, constantly bear in mind that by whatever method we proceed, a previous thorough cleansing of the teeth is absolutely indispensible. There is no known solution, alkaline or antiseptic, applicable in the human mouth, which will penetrate between the teeth or to the bottom of fissures and cavities, when these are filled with food, in sufficient quantity to have any appreciable effect. Therefore, before all antiseptics or alkaline washes come the toothbrush, toothpick, and floss silk.

In my experiments for determining the action of various antiseptics upon the fungi of tooth caries, it appeared to me that by allowing the antiseptic to act upon the fungi in their natural medium, saliva, I could obtain results of more practical value than by experimenting upon them in artificial solutions, and in pure cultures, neither of which ever occurs in the human mouth. Furthermore, since the fungi can attack the teeth only after a partial decalcification, we have in the first place to demand of an antiseptic, not so much that it destroys the fungi, as that it prevents the production of acid by them.* Consquently, if an acid reaction failed to appear in a solution of saliva and sugar to which a certain antiseptic had been added, as soon as in a like solution to which no antiseptic had been added (control), it was taken as evidence of the activity and value of the antiseptic used. This method could of course be used only with substances having a neutral reaction. The solutions were also subjected to a microscopic examination, to render the evidence doubly sure.

In the following table I have indicated the percentage of each antiseptic experimented upon which must be present in a sweetened saliva solution, to prevent the appearance of an acid reaction in twenty-four hours, or in case of alkaline or acid antiseptics, to prevent the development of the characteristic fungi in the same time.

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* The production of acid may be taken as synonymous with the development of the fungi, though the failure of the acid reaction to appear after a certain length of time does not necessarily indicate that the fungi have been *devitalized.*

For example, if to 100,000 parts of sweetened salvia we had one part of bichloride of mercury, the solution will not be found acid after the lapse of twenty-four hours, even though the control became sour in four or five hours. If we had only one part to 500,000, the acid reaction will appear somewhat later than in the control.

This table is designed to show the comparative strength of the antiseptics most commonly used. The action of the antiseptics having an acid or alkaline reaction upon the fungi, was determined by the use of the microscope alone.

| | Production of Acid —(Development of Fungi.)— | |
|---|---|---|
| | Prevented. | Retarded. |
| Bichloride of mercury | 1–100,000 | 1–500,000 |
| Nitrate of silver | 1 50,000 | 1–100,000 |
| Iodoform | 1–5,000 | 1–10,000 |
| Naphthaline | 1–4,000 (?) | 1–9,000 |
| Iodine | 1–6,000 | 1–15,000 |
| Oil of mustard | 1–2,000 | 1–5,000 |
| Permanganate of potas | 1–1,000 | 1–2.000 |
| Eucalyptus oil | 1–600 | |
| Carbolic acid | 1–500 | 1–,1000 |
| Hydrochloric acid | 1–500 | 1–,1000 |
| Phenylic acid | 1–200 | 1–500 |
| Liquid of Agate Cement | 1–250 | |
| Liquid of Excelsior Cement | 1–225 | |
| Lactic acid | 1–125 | 1–250 |
| Carbonate of sodium | 1–100 | 1–200 |
| Salicylic acid (Conc. alcohol sol.) | 1–75 | 1–125 |
| Alcohol | 1–10 | 1–20 |

The experiments show that bichloride of mercury is about two hundred times as powerful as carbolic acid, and demonstrate very clearly the mistake of substituting weak solutions of this antiseptic (1-1,000, as I have seen recommended) for concentrated carbolic acid. One one-thousandth is only one-fifth as powerful as pure carbolic acid, which in many cases may be used with impunity. It is consequently useless to attempt to introduce the sublimate solution for the purpose of sterilizing root canals, cavities before filling, &c., unless we may use at least one-half per cent. if not a one per cent. solution. I see no reason, however, why this may not be done. In a few cases I have used a one per cent. solution for treating root canals, and do not hesitate, particularly with the rubber dam adjusted, to wipe out cavities before filling with a two per cent. solution, and see no possible evil which could result from it. A well-known physiologist in Berlin has told me that he uses a one per cent. solution in his own mouth for aphthæ, and with excellent results. We should not, however, overlook the fact that a one per cent. sublimate solution is only one-fifth as powerful as pure iodoform.

As a mouth wash I have frequently used a one-tenth per cent. (1-1,000) solution myself, and have seen no bad results from it; I would not, however, recommend it to my patients in this strength. It has, besides, for me, an exceedingly disagreeable and lasting taste, which it is difficult to disguise, and produces an immediate increased secretion of saliva and mucus, which is very annoying. A one-fiftieth per cent. solution (1-5,000) may eventually be brought into use; in this concentration it is four times as powerful as a one per cent. solution of carbolic acid. The very high antiseptic power of nitrate of silver is particularly noteworthy. Why may it not be employed in place of the much more dangerous mercuric chloride?

The action of tobacco upon the fungi is worthy of notice. Five grammes of old Virginia plug were boiled fifteen minutes in fifty c. c. of water, the loss by evaporation being constantly replaced; the decoction was then filtered, and a portion added to an equal volume of saliva and sugar. This produced a mixture scarcely stronger than that which many veteran chewers carry around in their mouths all day, and in it the fungi led only a miserable existence.

Much more remarkable, however, was the action of tobacco smoke upon the fungi; the smoke from the first third or last quarter of a Colorado Claro cigar being found amply sufficient to sterilize ten c. c. of a beef-extract-sugar solution, previously richly infected with caries fungi.

In consideration of the strong antiseptic power of tobacco smoke, we might be inclined to infer that tobacco smokers should never suffer from caries of the teeth; it is evident, however, that there are very many points in the dental arch to which the smoke never penetrates.

In the preparation of cavities for inserting fillings, it is naturally often next to impossible to remove all the carious dentine, and in all such cases it is especially desirable that the filling material itself should possess antiseptic properties, since we, in using such a material, not only destroy those organisms existing in the carious tissue, but the material, if it remains permanently antiseptic, retards the working of the ferment organisms from without, and the appearance of secondary decay. We need, therefore, a material for filling which is not only antiseptic at the time of insertion, but which remains permanently so after being inserted.

I have endeavoured to determine the relative antiseptic power of different filling materials (cements, amalgams, &c.), not only at the moment of mixing, but after they were thoroughly dry, after they had lain some hours in sweetened saliva, and after they had been an indefinite time in the human mouth.

A large number of miniature test-tubes (homœopathic pill-tubes) were provided with cotton stoppers, and sterilized. Into each was brought one half c. c. of beef-extract-sugar solution, previously infected with carious fungi (pure culture). To the first tube was added a small drop of a one per cent. sublimate solution; the second tube was left untouched, and into the third, fourth, fifth, etc., were brought the filling materials whose antiseptic virtues were to be tested; these were in the form of cylinders two m. m. in diameter, and three m. m. long; if old fillings from the mouth were used, pieces were taken having approximately the same size.

These tubes now being placed in the incubator, their contents became cloudy one after the other. In those tubes which contained fillings of but slight antiseptic power, the development of the fungi proceeded rapidly, and the cloudiness soon appeared. If, on the other hand, the filling was strongly antiseptic, the development of the fungi was hindered, and the cloudiness appeared later. The first tube to which the sublimate solution had been added of course remained clear, and by comparing the others with this it was easy to see just when the turbidity began to show itself; the second tube, containing no antiseptic and no filling, served as the control, and the space that intervened after the control became turbid till any one of the other tubes became turbid was a measure of the antiseptic power of the material in that tube.

As the result of a great number of experiments, I have been able to get together the following Table :—

When the control tube becomes turbid in 5 hours, then—·

| | | | |
|---|---|---|---|
| A tube containing | an old oxy-phosphate filling becomes turbid in | 5 | hours. |
| ,, .. | ,, oxy-chloride ,, ,, ,, | 5 | ,, |
| ,, ,, | a gold cylinder becomes turbid in | 5 | ,, |
| ,, ,, | a Hill's stopping cylinder becomes turbid in | 5 | ,, |
| ,, ,, | an amalgam cylinder (kept 12 hours in saliva) becomes turbid in | $5\frac{1}{7}$ | ,, |
| ,, ,, | an agate cylinder (kept 12 hours in saliva) becomes turbid in | $5\frac{1}{4}$ | ,, |
| .. .. | an old amalgam filling becomes turbid in | $5\frac{3}{10}$ | ,, |
| .. .. | an amalgam cylinder (mixed dry) becomes turbid in | $5\frac{3}{8}$ | ,, |
| .. .. | an amalgam cylinder (mixed wet) becomes turbid in | $5\frac{1}{2}$ | ,, |
| ,, ,, | an oxy-phosphate cylinder (12 hours in saliva) becomes turbid in | $5\frac{1}{3}$ | ,, |
| .. .. | an amalgam cylinder (12 hours old) becomes turbid in | $5\frac{2}{3}$ | ,, |
| .. ,, | an old filling of tin and gold becomes turbid in | $5\frac{4}{5}$ | ,, |
| ,, ,, | an oxy-phosphate cylinder (12 hours old) becomes turbid in | 6 | ,, |
| ,, ,, | an agate cylinder (12 hours old) becomes turbid in | $6\frac{1}{4}$ | ,, |
| ,, ,, | an iodoform cement cylinder (12 hours in saliva) becomes turbid in | $6\frac{2}{5}$ | ,, |
| ,, ,, | a pyro-phosphate cylinder (mixed dry) becomes turbid in | $7\frac{1}{8}$ | ,, |
| ,, ,, | a pyro-phosphate cylinder (mixed wet) becomes tnrbid in | $7\frac{3}{8}$ | ,, |
| ,, ,, | an oxy-chloride cylinder (12 hours old) becomes turbid in | 9 | .. |
| ,, ,, | a piece of dentine from a tooth impregnated by a copper amalgam filling becomes turbid in | 11 | ,, |
| ,, ,, | an iodoform cement cylinder (12 hours old) becomes turbid in | 12 | ,, |
| ,, ,, | an iodoform cement cylinder (fresh) becomes turbid in | ? | ,, |
| ,, ,, | a globule of mercury becomes turbid in | — | ,, |
| ,, ,, | a cylinder of black oxide of mercury becomes turbid in | — | ,, |
| ,, ,, | a cylinder of any copper amalgam becomes turbid in | — | ,, |
| .. .. | any old copper amalgam filling becomes turbid in | — | .. |
| .. .. | a cylinder of oxy-chloride (fresh) becomes turbid in | — | .. |

The (--) signifies that the solution remained permanently clear.

We see from these results that the only filling at present in use which exerts a continual anti-ferment* action upon the walls of the tooth and its immediate surroundings is the old copper amalgam ; not only that, but the very substance of the tooth containing such a filling itself becomes antiseptic, a piece of bluish or bluish-green dentine from such a tooth very powerfully retarding the development of the fungi, and, indeed, in two cases completely destroying them. Secondary decay in such a case would be next to impossible, where anything like cleanliness was observed.

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* I use the terms "anti-ferment" and "anti-septic" interchangeably, though the former is, perhaps, preferable, since we are treating of ferment, and not septic organisms.

This result is well supported by observations which I have had abundant opportunity to make for the last five years, here where this material is so extensively used, and I do not hesitate to say that if our only object is to check the destruction of tissue by caries, there is no material at present in use with which this object may be so surely accomplished as with a good copper amalgam. It is a material, however, which I have never used, though I am not aware of any bad effect produced by it beyond the discoloration of the tooth. Skogsberg's iodoform cement came into my hands too late to complete the experiments with it. It has undoubtedly strong antiseptic properties, which it does not completely lose even when exposed to the saliva, and might no doubt be used to great advantage as a foundation for permanent fillings. Old fillings of tin and gold possess slight antiseptic power, still less (almost zero) old amalgam fillings (not copper). The very inconsiderable power of amalgams to prevent the development of ferment fungi is a source of some surprise, since we have been accustomed to look upon them as very active in this respect. It is probably a mistake to attribute the hardening of dentine under amalgam fillings to the antiseptic action of the amalgam, since, in the first place, it possesses this power to but a slight degree, and in the second place, the hardening may take place under fillings of gutta percha equally well. If we dry the cavity but indifferently well, and then choose a piece of gutta percha which we think will about fit the cavity, warm it and stuff it into the cavity, we of course can expect only bad results. If we proceed as follows we will obtain excellent results, as I have seen time and again: Adjust the dam, excavate carefully, especially the margins, wash with a strong antiseptic, dry thoroughly with bibulous paper and then with the hot-air syringe, till the surface of the dentine becomes whitish, paint with a thin solution of copal varnish, dry again with warm air, then put in the gutta percha in small pieces, one after the other, being sure that each piece sticks in its place, especially along the margin, just as if you were making a filling of gold. A piece which has once moved in its place must not be allowed to remain, as a leak will be the result. Remove such a filling after two years, and the cavity will often be found in an excellent condition for a gold filling.

The oxy-chlorides, when first mixed, are powerfully antiseptic, but soon lose their energy when exposed to the action of saliva.

The oxy-phosphates are very much inferior to the oxy-chlorides in antiseptic power, and should never be used in cavities where there is much soft dentine. This conclusion is borne out by my own experience in practice, and by that of others with whom I have conversed on the subject. Dr. Paetsch first called my attention to the disastrous results of such a practice, and his testimony was confirmed by that of Dr. F. P. Abbott, and others.

It must not be expected that the results given in the above table are absolutely free from error. The experiment is attended with more difficulties than are at first sight apparent; especially does the sterilization of the filling materials themselves involve much time and labour, and the results are not always constant. This was especially the case with iodoform cement. Amalgams and phosphates give quite constant results. The tests with some of the materials were made over twenty-five times; with others, such as copper amalgams, where there was no doubt as to the result, only a few experiments were made.

Caries of the teeth, except in the later or last stage, is the result of a ferment process, and the organisms found in the deeper parts of decaying dentine, which I have isolated and obtained in pure culture, are ferment organisms. The decomposition of the pulp and contents of the root canal, attended by bad-smelling products, is, on the other hand, a putrefactive process, in which entirely different species of fungi are concerned. Whether or not the results which I have obtained for the fungi of caries would apply equally well to those putrefactive fungi, is a question which can be settled only by experiment upon pure cultures of the same.

Although I have now, as I think will be granted, established upon a sure basis a fact that caries of the teeth may result directly from the action of acid-producing fungi in the presence of fermentable carbo-hydrates, the conclusion would hardly be justifiable that, by keeping the mouth constantly and perfectly free from all fermentable substances, or by repeated applications of antacids or antiseptics to all parts of the teeth, or by all these means together, we could ever banish dental caries from the oral cavity. A most powerful influence, which we do not well understand, is exerted by the nutritive processes in the teeth themselves.

I am assured by men who have grown old in the practice of Dentistry, that mouths which have long been under their observation, and which practically have been completely free from caries for years, at once, on account of some sudden change of health, show a general breaking down or crumbling of the teeth, *en masse*, in the space of a few weeks. It has also been my experience that patients who have been dismissed by their Dentists in America, with the assurance that according to previous experience their dentures would require no treatment for one or two years, have come to me a few weeks later with teeth looking as though they had not been under the hands of a Dentist for years. Some say the ocean voyage spoiled their teeth; others attribute it to a change in the climate, food, health, &c.

At any rate, we have here a cause which lies without the domain of both bacteria and acids (either ferment or otherwise). The lime salts of the teeth are supposed to form, with the organic matter of the tooth, a definite chemical compound, and it is probably due to this fact that simple salts of lime are so much more readily soluble in weak acids than pulverized tooth-bone, or that the tartar upon the teeth is so much more easily soluble than the teeth themselves; so that when any one rinses his mouth with vinegar, and afterwards finds lime in the vinegar, we know that the lime, in by far the greater part—if, indeed, we may not say altogether—came from the tartar. Now, though there is no positive evidence for the supposition, it is certainly not altogether improbable that, as a consequence of certain derangements in the nutritive functions of the teeth resulting from a change of health, &c., &c., a dissolution of the affinity between the lime salts and the organic matter may take place, thus setting free the easily soluble lime salts, which are then carried away in solution or washed out mechanically.

This is a supposition only, which I bring forwards because facts in this case are absolutely wanting. If it should, perchance, contain a trace of truth, then adult and pulpless teeth should be less subject to these *sudden* attacks of caries than young teeth with living pulps.

There still remains much hard work to be done before the subject of dental caries may be dismissed as having received a final solution *in all its different phases.* There are men enough in the profession, however, who are willing to work, and who do not shrink from the tasks yet to be performed.—*Independent Practitioner.*

# DENTITION AS INDICATIVE OF THE AGE OF THE ANIMALS OF THE FARM.

By Prof. T. G. Brown,

VETERINARY DEPARTMENT OF THE PRIVY COUNCIL.

*From the "Journal of the Royal Agricultural Society of England."*

*(Concluded from page* 310.*)*

## The Teeth of the Pig.

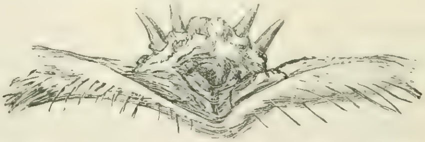
When the dentition is perfect, the pig has six incisor teeth in the front of both upper and lower jaw—two central, two lateral, and two corner teeth. Behind the corner teeth are the tusks, one on each side, in the upper and lower jaws. Between the tusks and the molar teeth there are usually four small teeth which are described as premolars, then one on each side of both jaws, and twenty-four molars, six on each side of the upper and lower jaws.

Temporary and permanent incisors agree generally in number, form, and position, but the temporary molars are only three in number on each side of the upper and lower jaws, and the third molar has three cusps instead of two. The temporary tusks are much smaller and more pointed than the permanent teeth which replace them, and the premolars are not represented by temporary teeth, but are permanent from the first.

It may be observed that no difficulty is found by the expert in distinguishing the permanent incisors from the temporary organs, especially when both orders are in the mouth together. The distinction is not, however, so marked as to secure the tyro from risk of error.

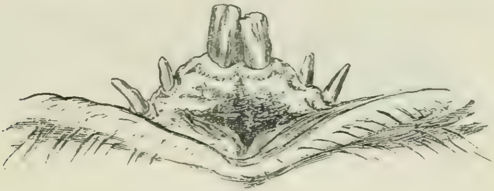
At birth the pig has two sharp-pointed teeth laterally placed in each jaw, top and bottom, leaving an open space in the front of the mouth (Fig. 42). The teeth much resemble small tusks; they are really the temporary tusks and corner incisors. No other teeth are in the mouth at the time of birth; but the temporary molars are immediately under the gum, and in the dried specimen they can be distinctly seen in their relative positions.

Fig. 42.—*Teeth of Pig at birth.*

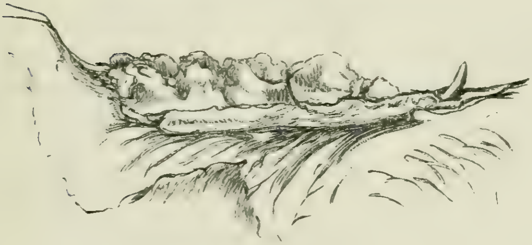


At one month old the three temporary molars on each side of the jaw, top and bottom, are cut, the second and third in position being well up, the first one just appearing through the gum; at the same time the two central temporary incisors in each jaw are cut, as shown in the illustration (Fig. 43).

Fig. 43.—*Incisors and Molars of Pig at one month.*



A. Incisors.

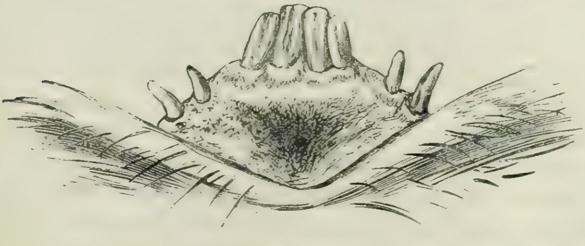


B. Molars.

At two months old the temporary central incisors are fully developed, and there are signs of the eruption of the lateral temporary incisors, which generally pierce the gums soon after two months. The first temporary molar is now nearly level with the second.

At three months old the pig has the temporary set of teeth fully developed, the lateral incisors by this time being nearly level with the centrals. The temporary corner teeth and the tusks are further removed from each other than they were at birth, owing to the growth of the jaw. In Fig. 44 the state of the teeth at three months old is indicated.

Fig. 44.—*Incisors and Molars of Pig at three months.*



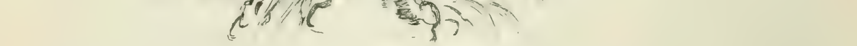
A. Incisors.

B. Molars.

Excepting the natural growth of the jaws, in common with other parts, no changes occur which will assist the examiner in judging the age of the young pig until the age of five months is reached. At this time there are evident signs of the cutting of the pre-molars ; and also the fourth molar, which is the first permanent tooth seen behind the temporary teeth.

The woodcut (Fig. 45) shows the state of dentition at the age of six months.

Fig. 45.—*Molars of Pig at six months.*



As a large number of pigs are entered at Agricultural Exhibitions at the age of between five and six months, it is necessary to devote particular attention to the signs which are exhibited by the teeth of the pig at this period ; and the inspector is particularly required to remember that the animal which he is inspecting in any class may be actually over the stated age at the time of inspection, without, in consequence, being liable to disqualification. This condition of things constantly occurs at the shows which are held after the date up to which the ages are calculated ; it is obviously necessary to add the days or weeks which have elapsed, to the animals' certified age, at the time of making the examination ; for example, in cases where ages are calculated to the 1st of June, while the Show takes place early in July, a pig which is certified to be five months three weeks and five days old in the class for animals not exceeding six months, will be more than a month over the certified age when it is seen by the inspector.

Again, it must be noted that the pre-molars are not always developed, and in the same litter one or two pigs will be found occasionally in which this tooth is absent. The fourth molar is, however, remarkably regular in its appearance, and may be referred to for the purpose of resolving any doubt which may arise in consequence of the absence of the pre-molars.

Disqualification of a pig or pigs entered as not exceeding six months would occur under such circumstances as the following. The inspector, it may be supposed, is examining the teeth of a pig which is entered as five months and two days; he adds the weeks which have elapsed since the date up to which the age is calculated, and deals with the animals as having arrived at the age of six months and nine days. At this period he expects to find the pre-molars and the fourth molar well up, the fourth molar being close to the angle of the jaw, and scarcely free from the covering of gum at the extreme posterior part. But if the fourth molar stands out from the angle of the jaw, leaving space behind it, and if he observes in addition that the temporary corners have been changed for permanents, he does not hesitate to assert that the pig is at least a month older than it is certified to be. In some pigs the corner permanents are found with their points through the gum at seven months, but in the majority of cases the temporary organs remain till the animal has reached the age of eight months.

At nine months, the corner permanent teeth are well up, and the presence of the permanent tusks may be through the gum in very forward animals at this age. In looking over the notes of the inspections which have been made for many years past, it is quite certain that, as a rule, the pig at the age of nine months has the temporary

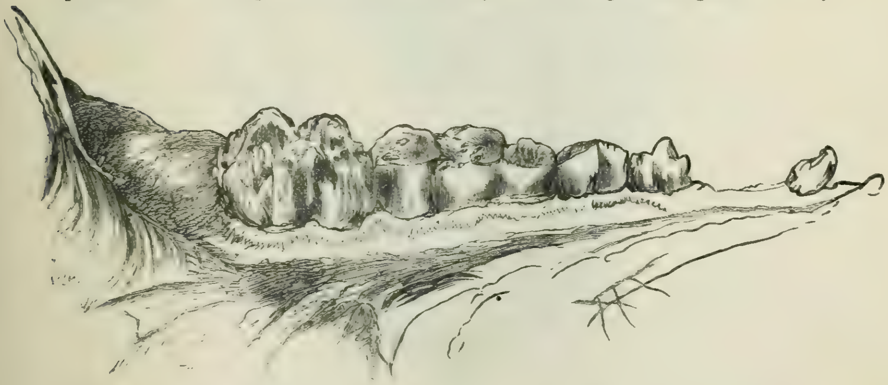


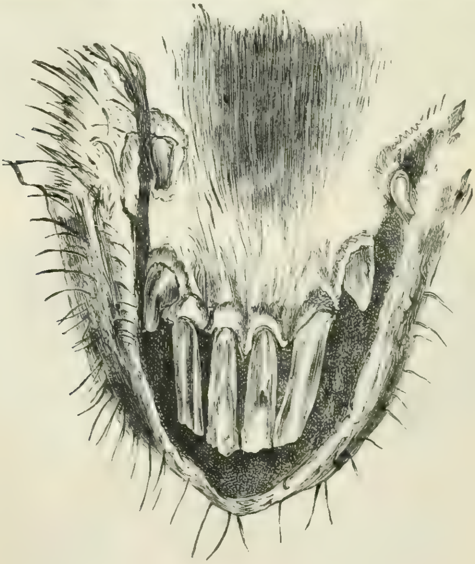
Fig. 46.—*Molars of Pig at nine months.*

tusks, or at least some of them, still in position ; in fact, the presence of well-developed tusks in a pig entered as not exceeding nine months would be a fair ground of disqualification, unless the animal were a boar, in which case early development of the tusks is expected. The drawings (Figs. 46 and 47) show the state of the teeth at nine months.

A class for pigs not exceeding nine months of age at many Shows takes the place of the six months' class, and therefore includes pigs of various ages from two or three months to over eight months. Disqualifications in this class generally affect pigs which are really under nine months, in which the state of the dentition indicates the age to be above that which is stated in the certificate. If, for instance, a pig which is entered as five months and two weeks has the corner teeth just cut, or one entered as six months and twenty-one days shows evidence of the changing of the temporary tusks, in these cases no hesitation is felt in disqualifying the animals.

One year old is the age when, according to received opinions, the central permanent incisors are cut. It is, however, the rule to find the temporary incisors still in their places in pigs which are just under the age of one year; and although the permanent teeth, when cut, advance very rapidly, a pig entered as not exceeding one year would be looked upon with much suspicion if the central permanent incisors were found to be fairly up ; and if they were fully developed, and at the same time, some of the anterior temporary molars had fallen, and

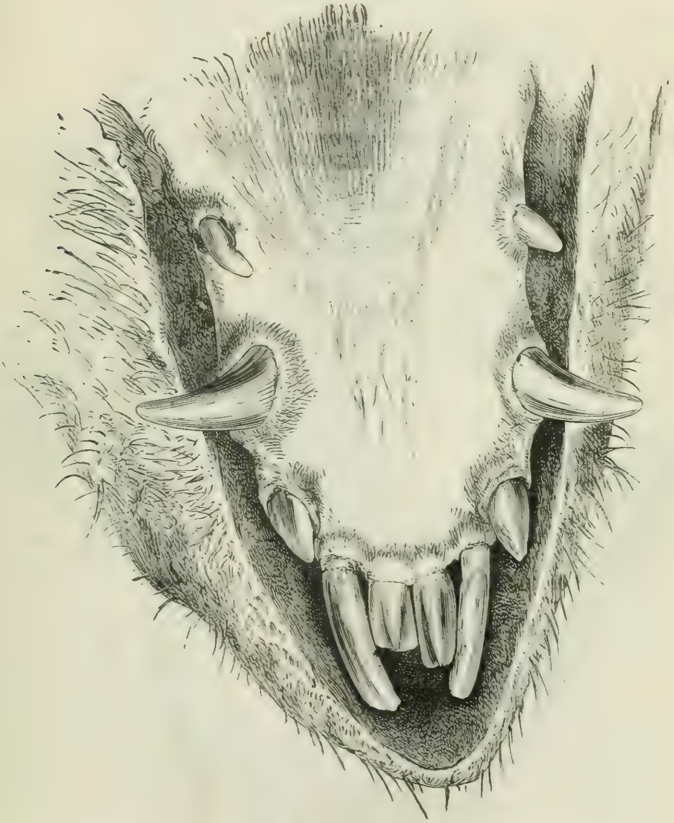
Fig. 47.—*Incisors and Tusks of Pig at nine months.*



the permanent teeth were filling their places, the animal would be disqualified.

The fifth molar tooth is always cut between ten and twelve months, and its perfect eruption may be taken as evidence that the pig has reached the age of one year. In the illustration (Fig. 48), the recently cut central incisors are shown, a state of dentition which is seen in very forward animals at the completion of one year of age.

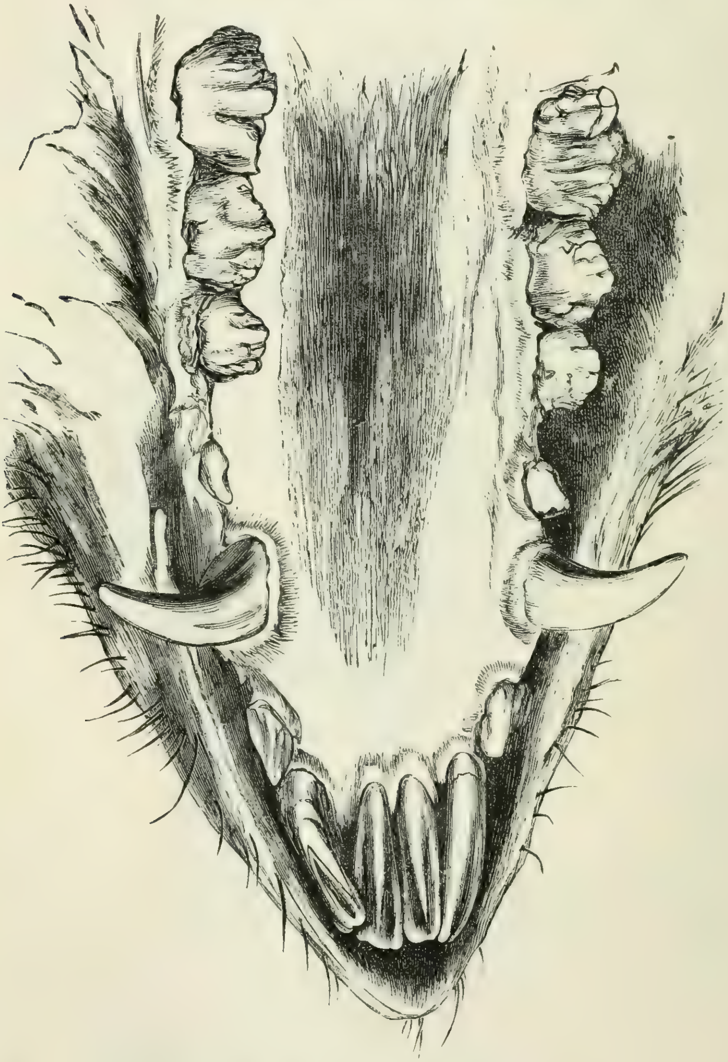
Fig 48.—*Incisors and Tusks of Pig at one year.*



Shortly after the completion of one year, the three anterior temporary molars fall irregularly; and by the time the animal is fifteen months old, the three anterior permanent molars are in the mouth, and may be readily known by their sharp unworn points, and their recent appearance, as shown in the illustration (Fig. 49). These teeth are very regular in their development, and afford valuable evidence in cases where an opinion cannot be formed from an inspection of the incisors alone.

The next change in the dentition is the final one, and occurs between the age of seventeen and eighteen months. At this period the sixth molar, a permanent tooth, is cut; and in forward animals the lateral temporary incisors are changed for permanent teeth. In many instances the temporary lateral teeth remain up to the age of eighteen months, although they are in such cases quite loose; and very often the permanent teeth are cutting through the gum below or by the side

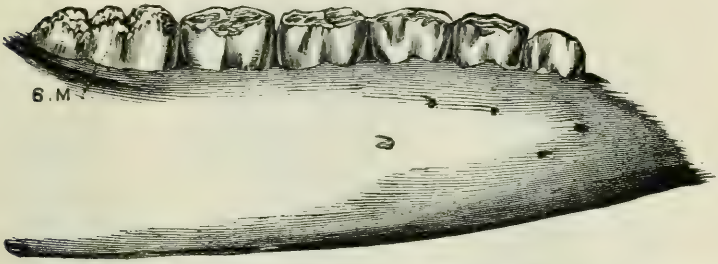
Fig. 49.—*Teeth of Pig at fifteen months.*



of them; in other instances one lateral is found to be fully up and nearly level with the centrals, while the other is just pushing through the gum. The sixth molar is also fairly up, but the posterior part of its crown is not quite clear from the gum. These changes complete the permanent dentition of the pig, and there are no indications of the age afforded by the teeth after this period, excepting such as depend on the growth and wear of the organs.

In the next illustration (Fig. 50) the sixth molar is shown as it appears at the completion of the age of eighteen months.

Fig. 50.—*Molars of Pig at eighteen months.*

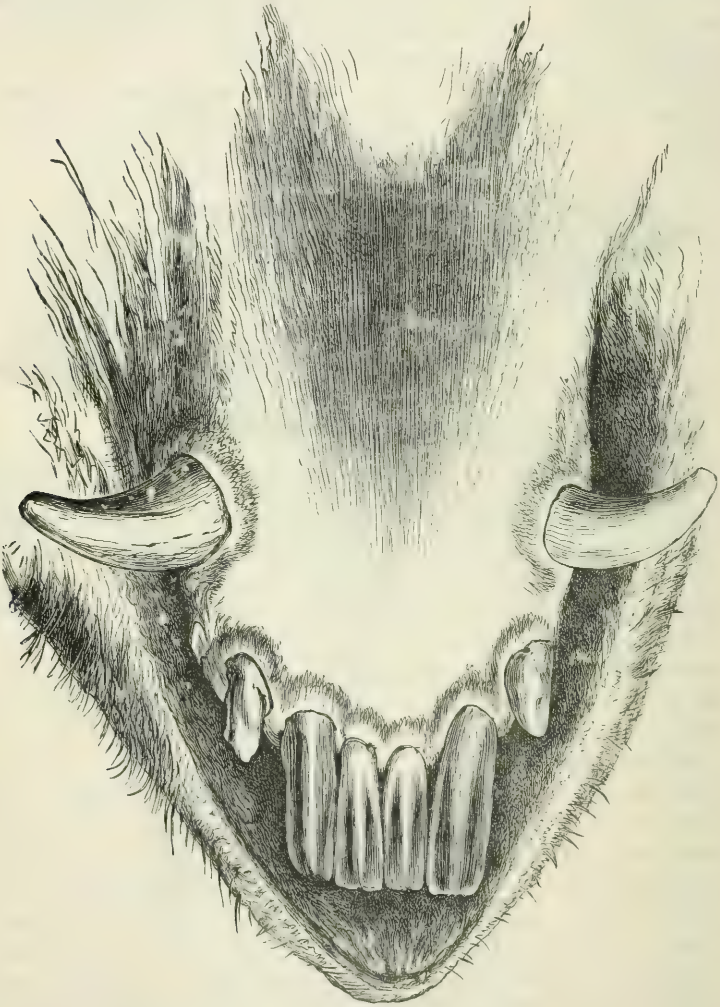


It is very important that the examiner should exercise the greatest circumspection in the inspection of the teeth of pigs which are exhibited in the class above twelve and not exceeding eighteen months old. Animals are entered at various ages from twelve to eighteen months; it is necessary therefore in this class to note the condition of the central incisors and the anterior molars, as well as that of the lateral incisors and the sixth molar. In the next drawing (Fig. 51) the full development of the lateral permanent incisors is shown. This state of dentition, it may be remarked, is indicative of a year and eight months.

At the age of two years the lateral permanent incisors are quite level with the centrals and are worn on their edges, the sixth molar now stands quite free from contact with the angle of the jaw, and indications of wear may be observed on the upper surfaces of the other molars. After the pig has attained the age of two years, an opinion as to the age must be to a great extent speculative. The wear which the teeth undergo, and the darkening of their colour, and the growth of the tusks, will afford some evidence which will assist the judgment; but there are no changes which can be referred to as indicative of the exact age of the pig after the lateral incisors and the sixth molars are fully developed.

In the course of the above remarks on the changes which occur in the teeth of the pig at different ages, certain exceptions to the rule of development have been mentioned; they are not numerous, nor very important in their bearings, and it is particularly worthy of notice that the exceptions are nearly always in favour of the exhibitor, being in the direction of retarded rather than accelerated development.

Fig. 51.—*Incisors and Tusks of Pig at one year and eight months.*



After an experience of some thirty years, I do not hesitate to affirm that of all animals on the farm, excepting the horse, the pig is the most free from dental irregularities ; and the evidence of age, which a skilled inspector may obtain from a careful examination of the teeth, may be accepted as free from any suspicion of error.

# THE TREATMENT OF EPILEPTIFORM NEURALGIA,

## OR THE SO-CALLED INCURABLE FACIAL TIC.

By W. J. Walsham, F.R.C.S.,

*Assistant Surgeon to, and Surgeon in charge of the Orthopædic Department at, St. Bartholomew's Hospital.*

(Reproduced from *The Practitioner.*)

"Although," says Trousseau,* "epileptiform neuralgia from its nature must be considered as an almost incurable affection, I have always felt it a duty to combat it by therapeutic means. . . . . . Of all the therapeutic agents that I have tried, and I have tried a great number with the utmost perseverance, opium is the one that has given me the least disappointment. But remember this, gentlemen, that opium in the treatment of epileptiform neuralgia must be given in large doses." And in large doses indeed did Trousseau give it—ten, twenty, or even thirty grains daily were in some cases found barely sufficient to relieve the pain ; one patient took as much as four hundred grains a day, and spent 1,200 francs during one year alone in the purchase of the drug. Here is a choice of evils ! Either to bear, as best one may, the agony of this terrible malady, or to be reduced to the pitiable condition of an opium or morphia *habitué.*

Since Trosseau published his admirable but discouraging lecture on epileptiform neuralgia a new field for the relief of pain has been opened to us ; and nerve-stretching, if it cannot cure the affection, can give the sufferer the prospect of months or years of immunity from it.

During the last few years I have had a series of six cases of this interesting form of neuralgia under my care, but it is not my intention to relate them in detail, as, although in none of them has there as yet been any return of the pain, I do not wish to publish them until a sufficient time has elapsed to show whether the, at present, apparent cure proves permanent. It is merely desired here to call attention to a method of treatment which, although it may not permanently cure, has at any rate already given to these patients many months and, to some, years of freedom from their suffering.

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* *Clinique Médicale de l'Hôtel-Dieu de Paris,* Paris, 1868, pp. 155–161.

As the disease is a somewhat rare one, it may be well, before passing to the treatment, to say a few words on the symptoms. The terms epileptiform neuralgia and incurable tic are, to say the least, unfortunate ones, inasmuch as the former implies that the affection is a form of epilepsy, which it is not, and the latter that it is incurable, which I think cannot now be affirmed of it. The terms, however, are here retained as those by which it is best known.

The disease is characterised by neuralgic paroxysms occurring in one or more branches of the fifth nerve, and is always, as far as I know, confined to one side only of the face. The pain as a rule is not constant, or, if so, is increased during the characteristic paroxysms. These seldom last more than half a minute at a time. In one of my patients they were said to last half-an-hour ; but they seemed to be rather a series of paroxysms following in quick succession than a single prolonged one. The pain almost invariably begins at one spot, that is, in one branch of the nerve, thence centrally spreads along that branch, and is radiated to the other branches of that division ; or it may be transmitted to a second or even to a third division of the fifth. A paroxysm may be determined by very various causes—speaking, eating, washing the face, a draught of cold air, a sudden noise, pressure on a certain spot, a fly settling on the beard—in short, anything even of the most trifling nature. During a paroxysm the action of the patient is characteristic. He rubs the part violently, or grasps his head between his hands, stamps upon the floor, or paces hurriedly about the room, convulsively clutches at anything within his grasp, or throws himself upon his couch or bed and writhes in agony. The pain is variously described by the patients as agonising, " like a bundle of red-hot wires being driven into the face, and then twisted in all directions," " like the seizing of all the teeth at once with dental forceps and rocking them to and fro," " like crushing the part in a vice," or " stabbing it in a thousand places at once with bradawls or sharp needles." A paroxysm comes on whilst the patient is describing his symptoms. He breaks off in the middle of a sentence or even a word, to undergo his torture ; the muscles of his face may visibly twitch, his conjunctivæ become suffused, a tear perhaps trickles over his cheek. Suddenly the attack ceases, and with a sigh of relief he resumes the history of his sufferings. A second paroxysm may not occur for half-an-hour, even though the irritation which produced the first is repeated; but more frequently there will be two or three during the next ten minutes. The number of paroxysms during the twenty-four hours varies greatly; they may occur during the day only, but more frequently during both night and day. Sometimes there may not be more than twenty or thirty in the twenty-four hours; at other times there may be two or three or even more every half-hour. They vary at different times in the year and are usually worse in the spring. When severe, they make the patient's life almost unbearable, preventing sleep and rendering the taking of food, which invariably brings them on, a dreaded evil.

The treatment may be divided into the Medical and Surgical. Of the former little need be said. Nearly every drug in the Pharmacopœia has, at one time or another, been tried with but little success. Opium in large doses, as given by Trousseau, undoubtedly relieves the pain for a time; but little permanent benefit can be expected from it, and the remedy, if remedy it can be called, would appear almost worse than the disease. Aconitia, given internally, has been strongly advised by Gubler as a specific. I tried it in two cases, but was disappointed. In one patient, the pulse under its use became intermittent every third beat, and it had to be relinquished after a few doses. In neither was any benefit apparent. Among the surgical measures may be mentioned neurotomy, or division of the nerve; neurectomy, or cutting a piece out of the nerve; nerve stretching; removal of one of the ganglia connected with the fifth; the application of the actual cautery; the introduction of hot needles into the supra-orbital, infra-orbital, or mental canal. Of the last-mentioned method of treatment I have had no practical experience, and the accounts I have heard of it are not encouraging. The actual cautery was employed in one of the cases before it came under my care, and seemed to give some relief for a few hours after each application, but no more. That merely temporary benefit is obtained by division of the nerve is well known; and even after a piece has been cut out the pain has soon returned. In three of my patients one or other of these operations on several occasions had been previously performed, but with the most evanescent relief, the pain returning as severe as before in a few days. Nerve-stretching, on the other hand, has been attended with the most happy results. In the first patient with this disease who came under my care I stretched the infra-orbital nerve ; the neuralgia was of ten years' duration, and for two years of this time the patient had been actually bedridden, as the pain was beyond endurance when she attempted to get up. All medical remedies had been tried and failed. The operation was performed in February, 1879. She was completely relieved, and when last heard of, three years afterwards, by my friend, Mr. Anderson (who sent her to me), she expressed herself as having been cured. The second patient, a man thirty-two years old, who had been an out-patient of Dr. Lauder Brunton's, had had the neuralgia for nine years. He had formerly been in good circumstances, but in consequence of his pain had been rendered unfit for any mental exertion, and had gradually lost his business. The neuralgia was confined to the regions supplied by the auriculo-temporal and inferior dental nerves. He had consulted many of the most eminent physicians in London and Paris, and various homœopaths, medical rubbers, and electricians, and had had the inferior dental and mental nerves divided by Messrs. Tomes and Durham. In April, 1883, I stretched the auriculo-temporal nerve, and a week later the inferior dental from within the mouth. The relief from pain was complete ; he has had none since, and is now again making headway in his business. The third patient, sixty years old, had suffered for eight years. The pain was confined principally to the inferior dental nerve. I stretched this in May, 1883. Since then he has had no pain except some slight twinges in the infra-orbital nerve (none in the inferior dental) for a few days in March, 1884, ten months subsequent to the operation, after having got wet through and taken a violent cold whilst following his occupation as a gardener. The fourth patient, a man fifty-six years old, had been in St. Bartholomew's Hospital for some time under the care of Dr. Church, and more lately as an out-patient under Dr. Lauder Brunton, to whom I was indebted for the case. He had suffered for five years. In November, 1883, I stretched the inferior dental and infra-orbital nerves, and he has remained well since. The fifth, a man seventy-three years old, had suffered for ten years with pain, chiefly in the inferior dental. He had had the mental branch cut and stretched with little or no benefit at the National Hospital for Epilepsy. In March, 1884, I stretched the inferior dental from within the mouth ; the patient, notwithstanding his age, had no bad symptom, and at present has had no return of his neuralgia.

In the sixth case a man, fifty-nine years old, had suffered for upwards of fourteen years. He had been under the care of several physicians, and had had the supra-orbital and infra-orbital stretched on various occasions. Looking to the success of the above cases, I attempted to stretch these nerves again, but found, on cutting down upon them, that the tissues were so matted together, as the result of the previous operations, that it was impossible to isolate them. An aneuryism needle was passed under the cicatricial tissue in the situation of the nerves, and an endeavour made to stretch it, but it did not yield to any appreciable extent. The pain was as severe after the operation as ever. On more closely questioning him, it was found that although he said the pain began in the cheek and darted upwards over the head, it really began in the gums in the region of the molar teeth, which had been previously extracted, *i.e.* in the posterior dental nerves, and shot upwards towards the back of the orbit. In January, 1883, I removed Meckel's ganglion and the whole of the superior maxillary nerve, after having forcibly stretched its proximal end from the foramen rotundum to the spot where it emerges on the cheek. The patient had no bad symptom ; he slept well the night after the operation, better than he had done for months ; he was up and about the ward in a few days, and has had no pain since.

The results of the above cases, I think, speak for themselves, and require no further comment. I have given the briefest outline of them, for, as previously said, I intend publishing them in full when a longer time has elapsed. In the meantime, when last heard of, the patients had been relieved for periods of three years, fourteen months, thirteen months, six months, three months, and five months, and even should the neuralgia again return, these many months of respite should alone compensate for the few days' confinement necessitated by the operation.

A few words on the methods of stretching the inferior dental and auriculo-temporal nerve. The operations for stretching the supra- and infra-orbital are too well known to call for any remarks. The inferior dental has been exposed in various ways :* (1) by division of the cheek, through its entire thickness, at a spot corresponding with the anterior edge of the ramus of the jaw, without dividing the mucous membrane; (2) by division of the cheek at a spot corresponding with the sigmoid notch; (3) by division of the soft parts over the posterior border of the ramus of the jaw in a direction from behind and below, inwards and upwards; (4) by removal of a portion of the angle of the jaw; (5) by trephining the ramus after division of the soft parts just above the commencement of the inferior dental canal; (6) from within the mouth. The last method of exposure was the one used for stretching the nerve in the above cases, and although I worked it out in the dissecting-room—not knowing that it had been already employed—I found, on looking up the subject, that it would appear to have been first resorted to by Paravicini. Its superiority over the other methods cannot, I venture to think, be questioned. No scar is left externally, and if the anatomy of the parts be borne in mind, the operation should not be attended with much, if any, difficulty. The mouth having been opened by a gag, an incision through the mucous membrane only is made from the last molar tooth in the upper jaw to the last molar tooth in the lower. The finger is now introduced into the wound and insinuated between the ascending ramus of the jaw and the internal pterygoid muscle. The small spur-like projection of bone at the entrance of the inferior dental canal is next felt for, and serves as a guide to the nerve. An aneurysm needle with a very short curve is now passed and hooked round the nerve, which can be then drawn visibly into the entrance of the wound. There are no important structures with the exception of the inferior dental artery and gustatory nerve in the near neighbourhood. The latter is best avoided by remembering that whilst the inferior dental nerve passes into the bone the gustatory continues its course between the bone and the muscle, and is anterior and a little internal in its relative position to the inferior dental. Should the artery be wounded it will probably be torn rather than cut, and therefore not likely to bleed; were it to do so, it is doubtful whether it could be tied, as the wound is deep and will barely admit the finger. There was no hæmorrhage in any of the above-related cases, but had there been I should have endeavoured to staunch it by plugging.

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* *Wiener medizinische Wochenschrift*, March 31, 1874, and *London Medical Record*, 1874, p. 275.

The internal lateral ligament which is inserted into the spur-like process of bone, follows somewhat the same course as the nerve, and may readily be mistaken for it. To avoid it the point of the aneurism needle should be made to hitch in the entrance of the canal, and thence swept upwards, backwards and outwards around the nerve, keeping the point close to the bone. As the parts can hardly be seen, the sense of touch must be trusted to as our guide. The wound, if the operation is neatly done, is small, and heals kindly and in a few days.

I am not aware that the auriculo-temporal nerve has been hitherto stretched ; but I have found a case recorded by Dr. McGraw,* in which the nerve was divided. The best guide to the nerve is the temporal artery. An incision about an inch long should be made parallel and immediately posterior to the artery, beginning just above the zygoma. Having carefully exposed the artery the nerve will be discovered just below and posterior to it. The nerve being of small size the dissection must be done neatly, or it will not be found.

Meckel's ganglion I removed by the operation which is known as Carnochan's. A description of this operation will be found in the *Proceedings of the Royal Medico-Chirurgical Society* (vol. i. No. 5, New Series) by Mr. Chavasse, and in the discussion that followed his paper an account of some modifications which I suggested might be desirable to make in its performance.

## DENTAL HOSPITAL OF LONDON.

### DISTRIBUTION OF PRIZES.

THE Annual Distribution of Prizes to the successful students at this School took place at the Hospital, Leicester Square, at five o'clock, on the 17th ult. In the absence, through illness, of Mr. Alfred Coleman, who was to preside, Sir Edwin Saunders occupied the Chair.

The proceedings began by the Dean, Mr. Morton Smale, reading the following Report :—

Before making my report, I am sorry to have to announce that Mr. Coleman, who should have presided on this occasion, is seriously ill, and quite unable to be present with us to-day. His absence is much to be regretted, as it was to have been his final public appearance before leaving the country, and would have given him an occasion to wish us good-bye, and us an opportunity of wishing him a long continuance of health in the land of his adoption.

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* *Detroit Medical Journal*, November, 1877.

At the last moment, then, we were without a President, and with the kindness that at all times characterises him, Sir Edwin Saunders consented to fill the breach at the shortest notice, for it was only on Monday I heard of Mr. Coleman's illness. We are already indebted to our Chairman for our present increased accommodation, it being entirely due to his generosity that we have now ample room for the requirements of the Hospital, students and patients—the two latter being very important factors in the welfare of our School.

The number of entries during the year has been about the same as last year; that there has been no large increase may, I think, be accounted for by the formation of provincial Schools; but with our increased accommodation and facilities for teaching, this School must stand pre-eminent as the teaching body for the British Dental Student.

Several important changes have taken place on the Staff since last July. Mr. Alfred Hill, who for 25 years had faithfully, energetically, and with such self-sacrifice, performed the duties, first of Assistant, and later as Dental, Surgeon, has resigned. Mr. Frederick Canton has been selected to fill the vacancy. Mr. Canton had for some years benefited the Hospital by his constant attention, skill and professional reputation in the position of Assistant Dental Surgeon. The vacancy thus caused has been filled by the election of Mr. Laurence Read, who served the Hospital as an excellent House Surgeon in 1877 and 1878.

Mr. Charles Tomes has resigned his lectureship on Dental Anatomy. This is a very great and irreparable loss; he is pre-eminently THE MAN for the position, and both staff and student regret his retirement.

Mr. Arthur Underwood has been chosen as his successor. Mr. Underwood has distinguished himself in the Dental world by original work, and will be a valuable addition to the teaching staff.

Mr. Ken Underwood, who for eight years had filled the position of Dean of the School, to the great satisfaction of all who came into communication with him, and who, by his genial and kindly manners and excellent administrative abilities, had gained the affection of all the students past and present, has resigned to take holy orders; we all, I am sure, wish he may very shortly become

Dean of another Chapter. The Medical Tutor was chosen as his successor. This caused a vacancy for a Medical Tutor, to which post Mr. W. B. Paterson has been elected; he distinguished himself as a student here and at Bartholomew's, and since his election he has successfully passed the final examination for the F.R.C.S.

Mr. Pillin has, aided by Mr. Buckland and Mr. Trott, ably filled the office of House Surgeons (they have all resigned), and deserve our best thanks for the efficient way in which they have done the work. Mr. Buckland has been promoted to the Senior House Surgeoncy, while Mr. King and Mr. Bardet have respectively been chosen Assistant and Deputy-Assistant.

Our pass list during the year has been good at the recent examination at the R.C.S.; only one of our men was rejected, and he, I am told, was nearly successful. Two have passed the primary examination for the M.R.C.S. This points not only to the excellent teaching of the staff lecturers, demonstrators and tutor, but also to the general *morale* and high tone found amongst our students; and it is my pleasure to bear testimony to the good work done by, and the excellent behaviour of, our present men.

The Saunders Scholarship has been won by Mr. Ackland, and well-earned; he has three first prizes—the Ash prize, and he ran Mr. Trott very closely for the Buchanan prize. He did not compete for the operating prize; during the year he has also passed his primary examination for the M.R.C.S.

The Lecturers, who will introduce their various prizemen to our President, will, no doubt, call attention to the fact that Mr. England has done very well, and specially deserves mention.

Mr. George Buchanan, who for some years has given a prize for the best essay on a Dental subject, discontinues it. If, in its place, an Entrance Scholarship, either in Science or Arts, could be founded, the Hospital would benefit; but it should be endowed, and not be in the power of the donor or donors to withdraw it.

In conclusion, I would thank, in the name of my colleagues, all who, by their presence here to-day, are giving us encouragement. The ladies who are honouring us we specially thank, for it is at times of victory and prize winnings that their praise and tribute to our successes is more than usually welcome, and stimulates the victor to fresh deeds of valour, and encourages those who have not been successful to new efforts.

The following is a list of Prizemen :—

The Saunders Scholarship, Mr. W. R. Ackland ; the Buchanan Prize, Mr. G. W. Trott ; the Ash Prize, Mr. W. R. Ackland.

Mechanical Dentistry ; *Prizes*, 1st Mr. W. R. Ackland, 2nd Mr. W. J. England ; *Certificate of Honour*, Mr. G. W. Trott.

Dental Surgery and Pathology ; *Prizes*, 1st Mr. W. R. Ackland, 2nd Mr. F. S. Peall ; *Certificates of Honour*, Mr. W. J. England, Mr. J. Mansbridge, Mr. R. May, Mr. T. H. G. Wrighton.

Dental Anatomy and Physiology ; *Prizes*, 1st Mr. W. R. Ackland, Mr. W. J. England, 2nd Mr. L. E. Sexton ; *Certificates of Honour*, Mr. F. S. Peall, Mr. G. O. Richards.

Operative Dental Surgery ; *Prize*, Mr. Bardet ; *Certificates of Honour*, Mr. J. C. V. Crocker, Mr. G. W. Trott.

After the prizes had been distributed, Sir E. Saunders addressed the students.

Sir Edwin remarked that he thought an explanation or an apology was due to them for his presence before them, considering that they had come there that afternoon in the full expectation of seeing their highly esteemed friend and colleague, Mr. Coleman. They all cherished that thought until last Monday evening, when they where shocked to hear that the state of his health was such that it would be impossible for him to be present amongst them. In addition to the pleasure of which his friends and former pupils would have listened to his wise counsels, there was an unusual interest attached to Mr. Coleman's appearing before them, as it was to be his farewell to them, previous to his departure for a more genial clime.

He had received a letter from Mr. Coleman, in which that gentleman expressed the deep gratitude he felt towards him (Sir Edwin) for presiding, and proclaimed sad disappointment at his inability to fill the honor imposed upon him, especially as he had looked forward to spending the evening among his old colleagues and pupils, with the intention of aking the opportunity of telling them how he had appreciated their forbearance to him, which had resulted in a mutual confidence and estimable friendship, which had for twenty years never been broken or suspended.

The Chairman then remarked that from the report they could all see that the efficiency of the School had been well maintained during the year. It would be on his part mere affectation or insincerity not to claim for the London School of Dental Surgery the first place amongst the Dental Institutions. With its increased space and unequalled advantages it would not be too much to say that it was without a rival. (Cheers.)

The history of the past year had not been uneventful. Changes had been made, and it was inevitable that the lapse of time and the growing fame of their professors should represent great losses to the staff of their Institution. But they must feel thankful that they had had such valuable services so long, and indulge in a cheerful hope that the position attained by them would be well kept up in the future.

Having referred to the addition to the eastern end of the Hospital building, Sir Edwin said it would be difficult, if necessary, to give the relative value of the two Institutions respectively. They were aware that the Hospital supplied the patients and the School the operators. The Institution depended upon the value of the staff, and the field for operations was afforded by the Hospital. Their influences were bound together, and must rise or fall together. In such a matter as that a dual control was not to be deprecated.

With regard to the feature of the day, gratifying as it had undoubtedly been to the recipients of the prizes, the pleasure with which the awards had been received, must have been greatly enhanced by the sympathy which greeted their announcement. The unsuccessful, far from feeling discouraged, should place himself diligently and assiduously to recover lost ground, having a well-grounded belief in himself.

A vote of thanks to the Chairman terminated the proceedings.

## FRASER v. ROBINSON.

In an action heard in the Liverpool County Court, before his Honour, J. F. Collier, on Thursday, 10th July, Mr. Samuel Fraser, Surgeon-Dentist, 39, Mount Pleasant, Liverpool, sought to recover the sum of £3 3s. for professional advice and attendance from Mr. Edwin Robinson, Seedsman, of Manchester. The circumstances of the case were peculiar and of interest to the Dental profession. According to the plaintiff's evidence, in March last he was introduced to the defendant by his brother, a Mr. D. Robinson, of Liverpool (who had been a patient of the plaintiff's for several years), in order to consult him concerning a set of teeth which had not given him satisfaction. Plaintiff declined to alter the teeth, but said that he felt sorry for the defendant, as he had had two sets made previously, neither being of any use to him, and, from knowing his brother for some time, he agreed to make him a set of teeth in vulcanite for £4, at the same time saying, "If they don't fit, don't have them." The new teeth were duly made, and the defendant called and had them fitted to his mouth, and expressed himself satisfied therewith. On defendant proposing to go away without paying for the teeth, and saying he would try them for a few days, and afterwards send a cheque, plaintiff objected to allow the teeth, to be taken away before payment. As defendant had not got the money to pay for them, the plaintiff obtained possession of the teeth and treated the contract as at an end. In suing the defendant for professional advice and attendance, he did not propose, in the action, to make any charge for the labour and material in the construction of the set of teeth, as he did not now intend the defendant to have them under any circumstances.

For the defendant it was contended that plaintiff could not revoke the contract and sue on the *quantum meritum;* also, that the contract was that if the teeth were not satisfactory they were not to be paid for, and that the defendant was to have a trial thereof before payment.

His Honour overruled the defendant's objection on the point of law, and held that there was no satisfactory evidence that plaintiff had agreed to waive his right to payment before delivery of the teeth, and therefore gave judgment for the plaintiff for £1 11s. 6d. (10s. 6d. each visit) for professional advice and attendance.

## STUDENTS SOCIETY OF THE DENTAL HOSPITAL OF LONDON.

### CONVERSAZIONE.

The President and Council of the above-named Society held a Conversazione at the Hospital, Leicester Square, on the 14th ult., at 8 o'clock p.m. As well as the rooms of the Hospital, which were profusely adorned with floral and other decorations, the Museum of the Odontological Society was open to visitors. There was a good display of microscopes, some of the slides showing the micro-organisms of dental caries, pus from alveolar abscess, &c.

Mr. Verrier demonstrated his method of producing continuous gum facing, "firing" several pieces during the evening. Messrs. Ash & Sons, Jamieson, Rutterford, and the Dental Manufacturing Company had good displays of dental instruments, &c. A programme of vocal and instrumental music was performed by past and present students, and, as an amateur achievement, the display of talent was of no mean order.

There was a large attendance of visitors, who highly appreciated the excellent entertainment provided and the unquestionably high-toned presage of the future of the Dental Profession.

## JOURNALISTIC SUMMARY.

### DENTAL COSMOS. (*June, PHILADELPHIA.*)

"EMBRYOLOGY WITH SPECIAL REFERENCE TO THE TEETH AND CONTIGUOUS PARTS," by Dr. J. L. Williams. This is the concluding portion of the article, sections of which have appeared in several previous numbers. The formation of the bones of the face with the superimposed Alveolar structure is here considered. The ossification of bone in cartilage and in membrane is illustrated, and the process of development is considered. Wherever the process of the growth of bone is going on there is also the accompanying phenomenon of absorption; and the active elementary agents in this process of absorption are large multinuclear giant cells called osteoclasts. They are developed from the medullary corpuscles or osteogenetic layer of the periosteum. He emphasises the importance of thoroughly apprehending the physiological significance of the so-called "indifferent" embryonal tissue. It is the universal plane, so to speak, where all animal organisations begin, and from which all structural differentiations originate. The development of embryonal corpuscles from a tissue preparatory to the formation of a new tissue seems to him to be in accordance with a law of nutrition and structural arrangement which is not generally recognised by physiologists. Keeping in view the important truth that all animal bodies, organs, tissues and elements of tissues, have their type limitations, we can readily understand that any stimulation of the nutrient activities beyond a certain point, after the type limitations have been reached or fulfilled, must result in internal changes of the elements of the tissues. He believes this to be a statement of a principle which will be found to be unvarying in all structural changes, whether normal or abnormal.

There is a beautiful illustration of the absorption of the root of a temporary tooth, showing the periosteum and absorbent cells *in situ*. The increased nutrient activity, undoubtedly immediately caused by the developing permanent tooth, has resulted in a division and subdivision of the nucleus of the medullary corpuscles lying next to the root of the tooth until each multiform cell is composed of from two to twelve or more smaller cells.

It may be that the lime-salts are dissolved, as suggested by Bilroth and Klein, by the formation of lactic acid, which changes the carbonate and phosphate of lime into soluble lactate of lime, which is taken up and removed by the vessels; but whatever the chemical process may be, from a physiological stand-point the process is in accordance with what has already been written. Both cementum and dentine are the structural materials formed from the osteoblasts or cementoblasts of the pericementum and the odontoblasts, and when these elements are stimulated into a special activity there results the liquifaction of the structural material as observed in many other instances. This view finds confirmation in the fact that, if this process is from any cause arrested, these same elements which have been active in the absorption of the tissue at once revert to their former function of building up the structural material.

"DENTAL MINISTRATIONS TO CHILDREN," by Dr. A. Howard Thompson. The only true system is to treat a child frankly and fairly, according to his own frank nature and natural intelligence. In the first place always be truthful; do not deceive the child by either under- or over-estimating, directly or indirectly, the pain or discomfort to be endured. If a lose tooth is to be removed, assure him plainly of the trifle of pain it will occasion, and appeal to his pride and his courage to endure it. Finding you truthful, he will afterwards believe you, and you will save much subsequent trouble in the filling of the deciduous teeth; the all important preliminary is to secure the confidence of the child, without that you can do nothing.

The successful cases of root-filling in temporary teeth are few and far between. The best operators concede that dead deciduous teeth had better be left unfilled, and, for several reasons, it is considered inexpedient to fill these teeth when dead.

Whatever deficiency of structure exists at eruption of the permanent teeth, it is corrected during adolescence, so that on maturity they are much more capable of resisting caries than on eruption ; at this time the tooth seems to be a frame work in which the condensation of the solidifying material (lime salts) is growing complete, but this deficiency is gradually corrected during the growing years. At eruption they are soft and porous like the temporary teeth, and fall early victims to the viscid and corrosive saliva of childhood and adolescence. During this critical era the cements and plastics will serve a better purpose in preserving them than gold. At maturity, when the teeth have acquired their complete density, these fillings can, and should, be removed and gold inserted. It is rare, no doubt, that the dental tissues are of sufficiently good texture during the growing years to warrant filling with gold.

### DENTAL COSMOS. *(July, PHILADELPHIA.)*

"COSMOLINE, in its Relation to Dental Therapeutics," by Dr. A. B. Harrower. Petroleol, or fluid cosmoline, is the product of a distillation of petroleum ; it remains liquid at as low a temperature as 32° Fahr., while plain cosmoline remains firm at a temperature of 100° Fahr. Like vaseline, it is bland, unirritating, and not liable to become rancid or to decompose. The writer has used cosmoline as an excipient in iodoform, arsenical, and inspissated canal pastes, and for the saturation of cotton canal dressings. He recommends the following formulæ :—

(1) Iodoform 20 grs., fluid cosmoline 10 drops, oil of cinnamon about $\frac{1}{4}$ of a drop.

(2) Arsenious acid 1 part, acetate of morphia 2 parts, plain cosmoline q.s., to make a paste of the desired consistency.

(3) Arsenious acid 5 grs., acetate of morphia 10 grs., fluid cosmoline 18 drops.

And, as an inspissated canal paste :—

Sulphite of lime 12 grs., acetate of morphia 4 grs., fluid cosmoline 24 to 30 drops.

NEW YORK ODONTOLOGICAL SOCIETY, April Meeting. Dr. J. Smith Dodge, jun., read a paper on the SPHEROIDAL TENDENCY OF AMALGAM—that amalgam fillings which change shape after becoming solid do so from the tendency of amalgam to assume the form of a sphere—upon which a long discussion ensued.

At the December meeting of the First District Dental Society, State of New York, Dr. E. Parmly Browne read a paper on the CROWNING OF TOOTH ROOTS, an abstract of which is given in this number of the *Cosmos*. Experience has shown that, in the extensive gold restoration of dead teeth—especially the back teeth of average mouths—the work, even when beautifully done in teeth of the best structure, is "like the house built upon the sand." Not that the gold was not strong nor well anchored, nor good at the margins, but that there was a lack of tooth-substance to which the gold could be permanently fixed. The remaining portions of the structure, through its canaliculi and fibrillæ, more or less devoid of living matter, are ever inviting, by absorption, the elements of destruction. A better method, which may be employed by the average dentist, and which is especially applicable to molars and bicuspids, consists in hermetically sealing every exposed portion of the tooth within a cap-crown.

Dr. W. H. Atkinson read a paper on LOOSE TEETH, and there is given the discussion which ensued.

THE SOUTHERN DENTAL ASSOCIATION. The sixteenth annual session was held in May, the subjects of papers being—DENTAL EDUCATION, by Dr. Winder; and REGULATING TEETH, by Dr. Patrick. The report is to be continued.

The editorial article deals with THE POWER OF STATE BOARDS OF DENTAL EXAMINERS.

### THE DENTAL REGISTER. *(July, CINCINNATI.)*

A PRACTICAL CASE OF IRREGULARITY, by Dr. C. P. Weinrich.

CARE OF CHILDREN'S TEETH, by Dr. Minnie F. Mosher.

"HOW TO SECURE GOOD DENTAL ORGANS, Prevent their Decay, Prevent Rickets, Hip Diseases, &c.," by Dr. E. H. Dennett. In discharge of their duties the Physican and Dentist are daily asked by their patients, "What must I do to prevent my teeth from decaying?" The answer should be, "Correct your diet." If we eat the products of grain, we must eat them with all their elements as furnished by nature; if we eat meat we must also eat bones, or our systems will suffer from the violation of one of Nature's unerring laws. The bones should be selected from perfectly healthy animals, none being used that bear the slightest blemish; carefully cured without being allowed to pass through any perceptible chemical changes, finely granulated and incorporated into soup, gravy, bread, &c., in the proportion of one to three spoonsful to each pint of soup, gravy or flour.

"COMPARATIVE DENTAL ANATOMY," by Dr. Morgan Adams. This was the subject of a paper read before the West of Scotland Branch of the British Dental Association, in Glasgow, in February last. The author refers to the strong and faultless condition of the teeth of wild animals, compared with many of the domestic animals. It is well known that the teeth of the dog are often worn off or wasted away by erosion, and his usefulness diminished long before he dies of old age, and I have often seen their teeth covered with tartar, and in some cases not well developed. A house cat was noticed suffering great pain: upon examination a diseased tooth was found to be the cause. It is also a well known fact that domesticated monkeys sometimes suffer from diseased teeth. I have never seen nor heard of any of these defects or troubles in the teeth of wild animals, and my opportunities for observation in this particular have been considerable. The differences in the teeth of the savage and the civilized man are well known to all who have given the subject the least thought. I have examined many skeletons of prehistoric races in America, and have never found caries, or evidence of any other disease in their teeth. I have had some opportunity of examining skeletons of the wild tribes now living in America. Caries are occasionally found in their teeth, but it is well known that they have far better teeth than men of civilized nations. Now we are told by investigators that bad teeth are one of the penalties of civilization, and they tell us the truth, but do they tell us the truth when they affirm that bad teeth are caused entirely from eating bread that has been deprived of a part of its nutritive principles? Savages and wild beasts feed upon raw food—this is given by some as the reason of their good teeth; but does this satisfy us? Does any thing as yet set forth fully satisfy us as to the cause of bad teeth? I answer no.

SOME OF THE DANGERS AND DISADVANTAGES OF ANÆSTHESIA, by Dr. David W. Cheever, was the subject of a paper read before the American Surgical Association in April last.

## OHIO STATE JOURNAL OF DENTAL SCIENCE. *(July. TOLEDO.)*

"THE HIGHER EDUCATION," by J. D. Moody. The average man would not pursue to a successful conclusion any study or work that had for its aim simply recreation or the general advancement of knowledge, as if something to act as a stimulus were held up before him. In what manner shall we best provide this needed stimulus? May I offer a suggestion? Create a new Dental degree, to be bestowed only upon such as have pursued a prescribed post-graduate course and passed satisfactory examinations in it. The examinations to be taken in one year or in twenty, only insisting that they be taken. The post-graduate course to be, scientifically, a very broad one; perhaps insisting that it must bear, directly or indirectly, upon some phase of Dental science. Also that the examination for this degree be preceded by one to show that the applicant is a more than ordinarily well informed person, or to have pursued some scientific study, *as* a study, or as a pastime, and to have attained a degree of eminence in it, thus proving his right to belong to a learned profession. I would, in this way, create a sort of Dental French academy—a Dental academy of sciences, something which it would be an honour to belong to, something really worth striving for.

"ANTISEPSIS," by Dr. Junkerman. Antisepsis is considered under the heads of surgical and medical; both seek the destruction of lower organisms. In the former, the prevention of putrefaction is sought for; in the latter, special remedies are administered to render the blood and tissues incapable of sustaining the life of these micro-organisms.

"DO WE ADMINISTER CHLOROFORM SCIENTIFICALLY?" by Walter W. Harrington. This article is continued from the previous number.

"THE CAUSES OF FAILURE IN DENTAL OPERATIONS," by Dr. J. R. Bell. Failures are often caused by too hastily diagnosing the cases; want of courage to cut away frail walls and weak points; lack of thoroughness in excavating cervical walls; allowing foreign matter to remain in nerve canals; the use of the same filling material for all classes of decay; one method of operating—such as contouring fillings for every case. Eclecticism is the only true method of theory and practice in Dentistry.

"IS IT HONEST?" The writer deals with the difficulty and expense of repairing pieces of continuous gum-facing.

### ITEMS OF INTEREST. *(July, PHILADELPHIA.)*

"HOW ANÆSTHETICS PRODUCE ANÆSTHESIA," by Dr. J. F. Sanborne. This was the subject of a paper read before the Iowa Dental Society in May last. The author first deals with something of the structure of sensations and the nervous system, and proceeds to state that, in order to produce anæsthesia, one of three things must transpire:—Prevent the oxidation of the tissues, that no nerve force shall be evolved; the rupture of the axis cylinder that must transmit the sensation; the nucleus of the nerve cells, or the granules of the brain, must be prevented from sending or receiving the impression. Either of each will prevent the accomplishment of the end desired. The article is to be concluded in the next number.

"ARTICULATION OF ARTIFICIAL TEETH, with a View to their Better Retention," by Dr. W. E. Driscoll. How are we to secure the backward pressure upon the upper sets and forward pressure upon the lower sets at the same time? It must be done by elevating the line of articulation at the front teeth as much as can be done with lower teeth extremely short. When setting up the teeth, leave a space between the front teeth that will allow an ordinary thickness of blotting paper to pass between their cutting edges when the molars are firmly set on their grinding surfaces. After a few days or weeks wear, the front teeth will be found striking together freely as hard as is desirable, if not so much so as to require some grinding to again throw the main pressure upon the back teeth. The outside and inside cusps of the molars, above and below, must be on an exact level—outside ones no higher than the lingual or palatal ones. When an extreme degree of absorption has taken place, the superior molars will extend near an inch from the upper gums. But let no one hesitate to try them in that way, and the result will be a surprise.

"ASSIMILATION," by Dr. W. H. Metcalf. This is a criticism of some articles that have appeared in current numbers of *Items of Interest.*

"CIRCULATION IN THE DENTAL TISSUES," by Dr. H. S. Chase. The writer having stated that all portions of the tooth are more or less intimately united by a system of lakes, canals, and other larger or smaller areas of fluid, by which blood plasma entering it by one dentinal canal, dentinal lacuna, or other microscopic sea, may be able to pass through this irrigating system to the most remote points from which it commenced its course, and also return again to the point from whence it started, either wholly or partially, by another route. In dental circulation we have osmotic and capillary attraction to carry the blood plasma along.

"COVERING OXYPHOSPHATE, AND LINING CAVITIES, &c.," by

Thomas Fletcher. On page 236, May issue, it is stated that there is nothing better than gutta percha varnish to cover an oxyphosphate filling whilst hardening, and its use as a lining to cavities is referred to. So far as his own experience goes it is of very little, if any, value for either purpose, owing to its doubtful adherence to most surfaces, tearing itself loose frequently by its own irregular contraction. For the two purposes specified there are two varnishes which are absolutely reliable, one a solution of roasted gum copal in ether 720, the other is a pasty mixture of bees' wax and chloroform. Both these adhere to any surface beyond the possibility of separation, and both are water-tight while they are in a perfectly soft and sticky state. The bees' wax varnish has the special advantage that it does not penetrate below the surface of fillings before they are hard, and so prevent proper setting. A solution of common resin in ether has to a great extent the same properties as copal, but owing to its permanent surface stickiness it is liable to be removed mechanically in a much shorter time than either of the other varnishes mentioned.

DENTAL NOMENCLATURE is the subject of an editorial article.

## SOUTHERN DENTAL JOURNAL. *(July, ATALANTA.)*

"THE RUBBER QUESTION." This article is continued from a previous number, and deals with the presence of mercury in vulcanite plates and its effects upon the mucous membrane of the mouth, and concludes that absorption of the alveolus, necrosis of the palatal bones, chronic ptyalism, and other constitutional effects of mercurial poisoning, do follow the use of rubber plates, evidently by the liberation of free mercury and the formation of the chlorides.

## THE DENTAL PRACTITIONER. *(June, PHILADELPHIA.)*

"DEVELOPMENT OF ENAMEL Similar to other Epidermoid Structures," being the subject of a paper read before the Odontographic Society of Pennsylvania in June last, by Dr. M. H. Cryer. The writer says, "It would be temerity in me to dispute a theory held by all histologists, and invite the criticism of the scientific members of the Dental profession, by announcing that the outer part of the enamel of the teeth is the first to be formed, and the portion next the dentine the last, did I not feel that I can demonstrate the absolute impregnability of my position."

"TAKING THE BITE," by Dr. Frank R. Faber. The writer describes his method of getting a correct bite by means of a trial plate of block tin, on which the wax is mounted and carved up to meet the requirements of the case.

## EXAMINATION QUESTIONS.

### FACULTY OF PHYSICIANS AND SURGEONS, GLASGOW.

THE following questions were given to candidates at the Dental Examination, on the 21st and 22nd ult.:—

### ANATOMY.

1. Describe the inner wall of a nasal fossa—*i.e.*, the septum narium.
2. Give the course and distribution of the facial nerve after its exit from the stylo-mastoid foramen.

### PHYSIOLOGY AND CHEMISTRY.

1. Describe the changes which take place in the heart during a complete cardiac revolution, with the accompanying sounds, giving the causes of the sounds.
2. Hydrogen, carbon, phosphorus, iron and potassium are severally burned in air. Show by equations the changes which occur in each case.
3. What is ozone, how may it be prepared, and what is the usual method of detecting its presence?

### SURGERY.

1. What is a wry-neck? What muscle is at fault? And what is the appropriate treatment?
2. Describe the operation for Hare-lip.

### MEDICINE AND MATERIA MEDICA.

1. Discuss and give examples of Dental diseases viewed (1) as a cause, and (2) as an effect of affections possessing more of a constitutional than a local character.
2. Define respectively an alterative, a cathartic, a diaphoretic and a tonic. Give one example of each, its dose and manner of administration.

### DENTAL ANATOMY AND PHYSIOLOGY.

1. Describe Meckel's Cartilage, and state what part it plays in intra-uterine life.
2. Describe the minute structure of Alveolo Dental Membrane, and state its origin and functions.
3. State the period and order of eruption of the temporary and the permanent teeth.

### DENTAL SURGERY AND PATHOLOGY.

1. Under what conditions may an exposed pulp be preserved, and how?
2. How are roots of teeth which have passed into the antrum to be got rid of?
3. What are the more common affections of the soft structures of the mouth? and give the treatment.

## ROYAL COLLEGE OF SURGEONS OF EDINBURGH.

Examination Questions for L.D.S. on July 15th :—

### ANATOMY.

1. Describe fully the Scapula, and name the muscles attached.
2. Give the branches of the Aorta and their distribution in the order of their occurrence, from its origin to its bifurcation in the Common Iliacs.
3. Describe generally the external configuration of the brain, and give, from before backwards, the structures seen on its under surface.

### PHYSIOLOGY.

Describe the mechanism of the respiratory movements ; mentioning the structures directly assisting in the ordinary performance of this function.

### CHEMISTRY.

1. In what condition is lime found in nature, and what do you understand by burning and slaking lime ? Giving the effects produced.
2. Mention the mechanical and chemical combinations of oxygen with nitrogen, giving the names and component parts of each compound.
3. Explain the reaction which occurs in the chemical combinations of sulphuric acid with zinc and with sulphide of iron.

## MR. VERRIER'S DEMONSTRATIONS.

On June 30th and July 1st, Mr. Verrier gave, at the London office of the Dental Manufacturing Co., a series of demonstrations in preparing Continuous Gum Facings to Rubber Cases. This particular process was fully described and illustrated in Vol. III. of the Dental Record. Mr. Verrier showed some improvements that have recently been introduced in connection with the work. Among them were the advantages—strength and less warping—to be gained by soldering the teeth to thin sheet platinum bent at right angles, instead of using wire or flat plate. It was also shown that by fixing the Bunsen burner so that the nozzle is about an inch from the aperture at the base of the furnace, the heating-up is considerably facilitated. The demonstrations were well attended, and that showed the increasing appreciation of this beautiful combination work.

## OBITUARY.

THE death of Mr William Audley, principal assistant to the Dental Manufacturing Company, occasions much regret. After six days' illness from acute pneumonia, he succumbed on the 18th ult., at the age of 29 years. He had been connected with the Company since its formation, and his services were highly appreciated not only by those who had business transactions with him, but also by his employers, while his *confrères*, one and all, esteemed and respected him.

## Editorial.

### PLICI-DENTINE.

To read a paper before a Society is said to be an effectual way of burying any information the article may contain. But even to please an enemy by writing a book is not a certain method of readily disseminating knowledge, particularly of a special kind. The writer of an article, in the July number of the *Journal of Microscopy*, on "The Microscope in Palæontology," refers to "the complicated infoldings of cement through the waving lobes of dentine in the teeth of the labyrinthodonts." The observations and arguments of Messrs Tomes upon the nature of this supposed intervening cement tissue have been overlooked by Dr. Malcom Poignand. Those very careful observers, to whom we are indebted for much of our knowledge of tooth structures, have shown that the lines of demarcation which contain lacuna-like spaces between the systems of dentinal tubes in plici-dentine are not occupied by cementum, but by dentinal tissue. "The mere presence of lacuna-like spaces is not sufficient to prove the presence of cementum, inasmuch as they occur on a small scale in the granular layer of dentine; moreover, when cementum and enamel are both present, the cementum is always outside the enamel, whereas at the upper part of the tooth of the labyrinthodon the characteristic inflections take place within a common investment of enamel which does not dip in. Thus the whole of the tissue constituting the very complex pattern of the labyrinthodon tooth is dentine, and the cementum does not, as was usually supposed, enter into its composition at all." *

The importance of accuracy in promulgating knowledge or even the latest views, for Professor Owen wrote his treatise on the labyrinthodonts over forty years ago, cannot be estimated too highly, and this is our apology for here reverting to this subject.

## ANNOTATIONS.

THE Medical Act Amendment Bill has again come to an untimely end. The Prime Minister announced in the House of Commons on Friday last that the Government had decided not to proceed further with the Bill during the present session. This is largely owing to the number of amendments proposed. It will be remembered that the Bill had passed the House of Lords, and had been read a second time in the Commons. The measure being now abandoned for this session necessarily involves the loss of a considerable amount of legislative time and energy. The same sacrifice occurred last year; but the disappointment caused by this second failure is greater than the former regret.

THE intended departure of Mr. Alfred Coleman for New Zealand, where he intends to take up his abode, gives rise to sorrow which is generally expressed. His absence in future from the several meetings of the profession will be much felt, for he was a frequent attender at such gatherings, and his observations always claimed that attention, respect, and value which long experience, careful observation, and facility of expression justly command.

We hope Mr. Coleman will derive benefit from the salubrious climate of the antipodes, and also that the profession will, for many years to come, have the benefit of fresh productions from his pen.

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* "Manual of Dental Anatomy," by Chas. S. Tomes, F.R.S., 2nd edit., p. 81.

## GOSSIP.

J. Wilson Fort, L.D.S. Eng., has been appointed Dental Surgeon to the Lancaster Infirmary.

A series of four dances, from eight o'clock till twelve, will be held in October, November, December, and January, at the Marlborough Rooms, Regent Street, in aid of the funds of the National Dental Hospital.

Prof. Koch has discovered in the rice-water evacuations of cholera patients a "comma-shaped" bacillus, but he has not been able to find any of it in the blood or tissues. As cholera is regarded as something more than a local distemper of the alimentary canal, and that the specific poison enters the system also through the respiratory organs, considerable doubt arises upon the question of the etiological significance of this particular bacillus.

The Physiological Bearing of Electricity on Health was the subject of a paper read at a Conference of the Society of Telegraph Engineers at the Health Exhibition by W. H. Stone, M.A., M.B. With regard to dangers to sight, the author said it was noted that the incandescent and the arc light subjected the eyes to two totally different risks, the former from heat rays at the less refrangible, and the latter from actinic and chemical action at the more refrangible, end of the spectrum. To obtain a sufficient protection in both cases, a pair of eye-protectors was shown, in which the front glass was blue, and the side "blinker" deep red. The former could be used alone for incandescent lamps, to remove glare and lessen irritation; while the side glass could be turned down over the blue when powerful arc lights had to be gazed at. If the two tints were well selected and combined by means of the spectroscope, a very handy and simple appliance was obtained, clearly conducive to health.

The case mentioned in the Dental Record ("Identification by Dentistry," p. 320) of a man named O'Connor, murdered by Mrs. and Mr. Manning is, "Nemo" writes, identical with the case of a man named O'Connell, murdered by a Mr. and Mrs. Manning, whose body was found buried in quicklime under the hearthstone of a house in Trinity Street, College Green, Bristol, about forty or fifty years ago. They were hung for this crime in the Bristol Gaol, on the New Cut.

Mr. J. Gray has been appointed Dental Surgeon to St. Bartholomew's Hospital, Rochester.

Dr. Roscoe, Professor of Chemistry in Owen's College, Manchester, has recently had the honour of knighthood conferred upon him in recognition of his services in connection with the Technical Education Commission, though, doubtless, his wide reputation as a chemist had also something to do with this mark of distinction being offered to him.

The Annual Meeting of the American Dental Society of Europe, at Vevey, Switzerland, on the 26th inst., and that of the British Dental Association, and of the Scottish branch in Edinburgh, on the 28th, 29th and 30th inst., as well as the Sixth Annual Meeting of the Western Branch, at Torquay, on the 2nd inst., will give ample opportunities for professional intercommunication.

Dr. T. T. Rignolds, writing in the *Lancet* on the "Nature and Treatment of Sea-Sickness," says: — A drop-dose of liquor atropiæ sulphatis, B.P., in a teaspoonful of water, should be given every hour till the physiological effect of the drug is produced. The sedative action of atropine on the medulla renders altered sensory impressions inoperative in producing sea-sickness. It should be given early in the affection, as when the more advanced or secondary stage is reached its effect is not so marked, though still beneficial.

## ANSWERS TO CORRESPONDENTS.

C. W. R.—There are several persons practising Dentistry who are not registered, and who use evasive announcements. The use of the title "Dental Supply Stores" is a question for a magistrate, if it is a description implying that the proprietor is registered under the Dentists' Act, or that he is a person specially qualified to practise Dentistry. A prosecution can be instituted only by, or with, the permission of the Medical Council.

Pupil.—Full particulars will be given in the September (Students') number.

THE

DENTAL RECORD.

VOL. IV. SEPTEMBER 1, 1884. No. 9.

# Educational Section.

## SUGGESTIONS TO STUDENTS.

THE Professional Education of the Dental Student consists of Apprenticeship, or instruction in Mechanical Dentistry, for a period of not less than three years: Attendance on Lectures, &c., at a General Hospital and Medical School for two Winter and one Summer Sessions—eighteen months: Also attendance at a Dental Hospital and School for two years. The attendance at the General Medical and at the Special Dental Hospitals and Schools may be carried out simultaneously, and completed in two years. This plan of work takes up the whole of the Student's time, and it is impossible for him to concurrently engage in any Mechanical or other employment.

Before commencing his Professional Education, the Dental Student must pass a Preliminary Examination in Arts. The examination most to be recommended is the matriculation of the University of London. Passing that examination will enable the student subsequently to present himself for an University degree, should he desire to do so. A list of the several examinations recognised by the General Medical Council as fulfilling the conditions required by that body regarding Preliminary Education is to be found on page 388.

Any one who commenced his professional education before the 22nd July, 1878, is exempt from the Preliminary Examination.

After passing a Preliminary Examination, the student must receive at least three years' instruction in Mechanical

Dentistry under a registered Dentist. It should be distinctly understood that the Royal College of Sugeons of England considers those three years of instruction, whether in the form of serving articles, or apprenticeship to Mechanical Dentistry, or otherwise, as Professional Education ; therefore, they follow the Preliminary Examination.

Having received a certificate of his Preliminary Examination, and commenced his Professional Education, either by apprenticeship or by hospital studies, it is necessary to register the same at the Medical Council Office, 299, Oxford Street, London, W. This must be done within fifteen days from the commencement of the pupil's professional studies. The beginning of such studies will not be recognised by any of the qualifying bodies as dating earlier than fifteen days before the time of registration.

Any one registered as a Medical Student must also register as a Dental Student, if he be such.

Having served his articles, the student may enter a General or a Dental Hospital, or both, and complete the Curriculum of at least four years of study from the date of registration ; after which he is eligible to be admitted to examination for the Dental License.

Though the possession of the License in Dental Surgery is necessary for a name to be entered on the *Dentists' Register*, the student is strongly recommended to obtain some additional qualification in either Medicine or Surgery. On the other hand, though a Medical or a Surgical, other than the special Dental, qualification entitles its possessor to practise Dentistry, yet the course of study for such does not include any Dental instruction. Therefore, to be a Dentist requires a more or less complete compliance with the Dental Curriculum.

It will be observed that the Curricula of the several Licensing Bodies differ somewhat from one another. The Curriculum of the Royal College of Surgeons of England exceeds the course of study recommended by the Medical Council by prescribing attendance upon a second course of lectures on Dental Anatomy [illegible] Dental Surgery and Dental

Mechanics. The Royal College of Surgeons of Edinburgh, and the Faculty of Physicians and Surgeons of Glasgow, require only six, instead of not less than twelve, months' attendance at a recognised General Hospital, with clinical instruction. The Curriculum of the Royal College of Surgeons in Ireland does not include a course of lectures on Anatomy of the Head and Neck, or a second course of Anatomy ; nor a special course of lectures on Physiology ; a course of lectures on Medicine ; nor lectures on Dental Anatomy ; and it only requires nine months', instead of two years', Dental Hospital Practice.

## REGISTRATION OF DENTAL STUDENTS.

The Registration of Dental Students shall be carried on at the Medical Council Office, 299, Oxford Street, London, W., in the same manner as the existing Registration of Medical Students—as hereinafter set forth—and subject to the same regulations as regards Preliminary examinations.

Students who commenced their professional education by apprenticeship to Dentists entitled to be registered, or by attendance upon professional lectures, before July 22nd, 1878 (when Dental education became compulsory), shall not be required to produce evidence of having passed a Preliminary Examination.

Pupils who have been articled to their fathers, or to brothers—with whom money transactions would be nominal—shall, in all other respects, be considered to be in the same position in regard to registration as those pupils provided for in the first part of Section 37 of the Dentist's Act, who have paid premiums for instruction.

Candidates for a Diploma in Dental Surgery shall produce certificates of having been engaged during four years in Professional Studies, and of having received three years instruction in Mechanical Dentistry from a registered Practitioner.

One year's *bonâ fide* apprenticeship with a registered Dental Practitioner, after being registered as a Dental Student, may be counted as one of the four years of Professional Study.

The three years of instruction in Mechanical Dentistry, or any part of them, may be taken by the Dental Student either before or after his registration as a Student ; but no year of such Mechanical instruction shall be counted as one of the four years of Professional Study unless taken after registration.

The privilege provided by the first clause of Section 37 of the Dentist's Act, for persons whose Articles of Apprenticeship expired before January 1st, 1880, shall be extended to all persons whose Articles had begun two years before that period.

The commencement of the course of Professional Study recognised by any of the Qualifying Bodies shall not be reckoned as dating earlier than fifteen days before the date of registration.

Forms for Registration may be obtained at the office of the General Medical Council.

## PRELIMINARY EDUCATION.

### REGULATIONS OF GENERAL MEDICAL COUNCIL.

No person shall be allowed to be registered as a Medical or Dental Student unless he shall have previously passed a Preliminary Examination in the subjects of General Education as specified in the following list * :—

1. English Language, including Grammar and Composition. †
2. English History.
3. Modern Geography.
4. Latin, including Translation from the original, and Grammar.
5. Elements of Mathematics, comprising (*a*) Arithmetic, including Vulgar and Decimal Fractions; (*b*) Algebra, including Simple Equations; (*c*) Geometry, including the first two books of Euclid, or the subjects thereof.
6. Elementary Mechanics of Solids and Fluids, comprising the Elements of Statics, Dynamics and Hydrostatics. ‡

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* The Examinations in General Education conducted by Universities will be accepted as heretofore, but if in any of these Examinations the subjects of Elementary Mechanics of Solids and Fluids are not included, the Candidate must pass in one or other of the remaining optional subjects instead, and a knowledge of Elementary Mechanics will be required at a subsequent examination."

† "The General Medical Council will not consider any Examination in English Language sufficient that does not fully test the ability of the Candidate; (1) To write sentences in correct English on a given theme, attention being paid to spelling and punctuation as well as to composition; (2) to write correctly from dictation; (3) to explain the grammatical construction of sentences; (4) to point out the grammatical errors in sentences ungrammatically composed, and to explain their nature; and (5) to give the derivation and definition of English words in common use."

‡ "This subject may be passed either as Preliminary, or before, or at the first Professional Examination."

7. One of the following Optional subjects:—
   (*a*) Greek; (*b*) French; (*c*) German; (*d*) Italian; (*e*) any other Modern Language; (*f*) Logic; (*g*) Botany; (*h*) Elementary Chemistry.

The following is a list of Examining Bodies whose Examinations fulfil the conditions of the Medical Council as regards preliminary education:—

### I.—UNIVERSITIES IN THE UNITED KINGDOM.

UNIVERSITY OF OXFORD;—

1. Junior Local Examinations; Certificate to include Latin and Mathematics, and also one of the following optional subjects:—Greek, French, German, Natural Philosophy, including Mechanics, Hydrostatics and Pneumatics.
2. Senior Local Examinations; Certificate to include Latin and Mathematics.
3. Responsions.
4. Moderations.
5. Examination for a Degree in Arts.

UNIVERSITY OF CAMBRIDGE:—

6. Junior Local Examinations; Certificate to include Latin and Mathematics, and also one of the following optional subjects:—
   Greek, French, German, Natural Philosophy, including the Elements of Statics and Hydrostatics.
7. Senior Local Examinations; Certificate to include Latin and Mathematics.
8. Higher Local Examinations.
9. Previous Examination.
10. Examination for a Degree in Arts.

UNIVERSITY OF DURHAM:—

11. Junior Local Examination; Certificate to include Latin and Mathematics, and also one of the following optional subjects:—
    Greek, French, German, Natural Philosophy, including Mechanics, Hydrostatics and Pneumatics.
12. Senior Local Examinations; Certificate to include Latin and Mathematics.
13. Registration Examination for Medical Students.
14. Examination for Students at the end of their first year.
15. Examination for a Degree in Arts.

UNIVERSITY OF LONDON :—

16. Matriculation Examination.
17. Preliminary Scientific (M.B.) Examination.
18. Examination for a Degree in Arts or Science.

VICTORIA UNIVERSITY :—

19. Preliminary Examination; Latin to be one of the subjects.

UNIVERSITY OF EDINBURGH :—

20. Local Examinations (Junior Certificate); Certificate to include English Literature, Arithmetic, Algebra, Geometry, Latin, and also one of the following optional subjects :—
    Greek, French, German, Natural Philosophy.
21. Local Examinations (Senior Certificate); Certificate to include English Literature, Arithmetic, Algebra, Geometry, Latin, and also one of the following optional subjects :—
    Greek, French, German, Natural Philosophy.
22. Preliminary Examination for Graduation in Science or Medicine and Surgery.
23. Examination for a Degree in Arts.

UNIVERSITY OF ABERDEEN :—

24. Local Examinations (Honours Certificate); Certificate to include English Literature, Arithmetic, Algebra, Geometry, Latin, and also one of the following optional subjects :—
    Greek, French, German, Natural Philosophy.
25. Preliminary Examination for Graduation in Medicine or Surgery.
26. Examination for a Degree in Arts.

UNIVERSITY OF GLASGOW :—

27. Local Examinations (Senior Certificate); Certificate to include English Literature, Arithmetic, Algebra, Geometry, Latin, and also one of the following optional subjects :—
    Greek, French, German, Natural Philosophy.
28. Preliminary Examination for Graduation in Medicine or Surgery.
29. Examination for a Degree in Arts.

UNIVERSITY OF ST. ANDREW'S :—

30. Local Examinations (Honours Certificate); Certificate to include English Literature, Arithmetic, Algebra,

Geometry, Latin, and also one of the following optional subjects:—

Greek, French, German, Natural Philosophy.

31. Preliminary Examination for Graduation in Medicine or Surgery.
32. Examination for a Degree in Arts.

UNIVERSITY OF DUBLIN:—

33. Public Entrance Examination.
34. Examination for a Degree in Arts.

QUEEN'S UNIVERSITY IN IRELAND:—

35. Local Examination for Men and Women; Certificate to include all the subjects required by the General Medical Council.
36. Entrance or Matriculation Examination.
37. Previous Examination for B.A. Degree.
38. Examination for a Degree in Arts.

ROYAL UNIVERSITY OF IRELAND:—

39. Matriculation Examination.

OXFORD AND CAMBRIDGE SCHOOLS' EXAMINATION BOARD:—

40. *Certificate, to include the following subjects:—
    (*a*) Arithmetic, including Vulgar and Decimal Fractions;
    (*b*) Algebra, including Simple Equations;
    (*c*) Geometry, including the first two books of Euclid;
    (*d*) Latin, including Translation and Grammar;
    (*e*) Also one of these optional subjects:—
        Greek, French, German, Mechanical Division of Natural Philosophy.

## II.—OTHER BODIES NAMED IN SCHEDULE (A) TO THE "MEDICAL ACT."

APOTHECARIES' SOCIETY OF LONDON:—

41. Examination in Arts.

ROYAL COLLEGES OF PHYSICIANS AND SURGEONS OF EDINBURGH:—

42. Preliminary (combined) Examination in General Education.

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* The *English* is provided for by the following *Resolution*, passed by the Executive Committee on October 27th, 1876 (*Minutes*, Vol. XIII., p. 357):—

"That, as every Candidate for the Certificate of the Oxford and Cambridge Schools' Examination Board is required to answer questions in such a manner as to satisfy the Examiners that he has an adequate knowledge of English Grammar and Orthography, this shall be held as conforming to the requirements of the Medical Council in reference to English Language."

Faculty of Physicians and Surgeons of Glasgow:—

43. Preliminary Examination in General Education.

Royal College of Surgeons in Ireland:—

44. Preliminary Examination; Certificate to include Mathematics.

Apothecaries' Hall of Ireland:—

45. Preliminary Examination in General Education.

### III.—EXAMINING BODIES IN THE UNITED KINGDOM, NOT INCLUDED IN SCHEDULE (A) TO THE "MEDICAL ACT" (1858).

College of Preceptors:—

46. Examination for a First Class Certificate, or Second Class Certificate of First or Second Division, Algebra, Geometry, Latin, and a Modern Language, having been taken.

Examinations for Commissions and Appointments in Her Majesty's Service, Military, Naval, and Civil:—

47. Certificate to include all the subjects required.

Intermediate Education Board of Ireland:—

| | |
|---|---|
| 48. Junior Grade Examination | Certificate in each case to include all the subjects required. |
| 49. Middle Grade Examination | |
| 50. Senior Grade Examination | |

### IV.—CERTAIN EXAMINATIONS OF INDIAN, COLONIAL, AND FOREIGN UNIVERSITIES AND COLLEGES.

## REGULATIONS OF THE VARIOUS EXAMINING BODIES FOR THE DIPLOMA IN DENTAL SURGERY.

### PROFESSIONAL EDUCATION REQUIRED BY THE ROYAL COLLEGE OF SURGEONS OF ENGLAND.

Candidates are required to produce the following Certificates:—

1. Of being twenty-one years of age.
2. Of having been engaged during four years in the acquirement of professional knowledge.
3. Of having attended, at a school or schools recognised by this College, not less than one of each of the following courses of lectures, delivered by lecturers recognised by this College, namely: Anatomy, Physiology, Surgery, Medicine, Chemistry, and Materia Medica.

4. Of having attended a second winter course of lectures on Anatomy, or a course of not less than twenty lectures on the Anatomy of the Head and Neck, delivered by lecturers recognised by this College.
5. Of having performed dissections at a recognised school during not less than nine months.
6. Of having completed a course of chemical manipulation, under the superintendence of a teacher or lecturer recognised by this College.
7. Of having attended, at a recognised Hospital or Hospitals in the United Kingdom, the practice of Surgery and Clinical Lectures on Surgery during two Winter Sessions.
8. Of having attended, at a recognised school, two courses of lectures upon each of the following subjects, namely:—Dental Anatomy and Physiology (Human and Comparative), Dental Surgery, Dental Mechanics, and one course of lectures on Metallurgy, by lecturers recognised by this College.
9. Of having been engaged during a period of not less than three years in acquiring a practical familiarity with the details of Mechanical Dentistry, under the instruction of a competent Practitioner. In the cases of qualified Surgeons, evidence of a period of not less than two, instead of three years, of such instruction will be sufficient.
10. Of having attended at a recognised Dental Hospital, or in the Dental Department of a recognised General Hospital, the practice of Dental Surgery during the period of two years.

NOTE.—All Candidates who shall commence their professional education on or after the 22nd July, 1878, will, in addition to the certificates enumerated in the foregoing clauses, be required to produce a certificate of having, prior to such commencement, passed the preliminary examination in general knowledge for the Diploma of Member of the College, or an examination recognised as equivalent to that examination.

Candidates who were in practice as Dentists, or who had commenced their education as Dentists prior to September, 1859—the date of the Charter—and who are unable to produce the certificates required by the foregoing Regulations, shall furnish the Board of Examiners with a Certificate of Moral and Professional Character, signed by two Members of this College.*

Together with answers to the following inquiries :—

Name Age Professional Address.

If in practice as a Dentist, the date of the commencement thereof.

Whether Member or Licentiate of any College of Physicians or Surgeons of the United Kingdom ; and, if so, of what College.

Whether Graduate of any University in the United Kingdom ; and, if so, of what University ; and whether Graduate in Arts or Medicine.

The date or dates of any such Diploma, License, or Degree.

Whether Member of any Learned or Scientific Society ; and, if so, of what.

Whether his practice as a dentist is carried on in connection with any other business ; and, if so, with what business.

Whether, since 22nd July, 1876, he has employed Advertisements or Public Notices of any kind in connection with the practice of his Profession.

The particulars of Professional Education, Medical or Special.

The Board of Examiners will determine whether the evidence of character and education produced by a Candidate be such as to entitle him to Examination.

## PROFESSIONAL EXAMINATIONS.

The Examination is Written, Oral, and Practical.

The Written Examination comprises General Anatomy and Physiology, and General Pathology and Surgery, with especial reference to the practice of the Dental Profession.

The Oral and Practical Examinations comprise the several subjects included in the curriculum of professional education, and is conducted by the use of preparations, casts, drawings, and by operations, &c.

Members of the College, in the Written Examination, will only have to answer those questions set by the Section of the Board consisting of persons skilled in Dental Surgery ; and in the

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* N.B.—In the case of Candidates in practice, or educated in Scotland or Ireland the Certificate of Moral and Professional Character may be signed by two Licentiates of the Royal College of Surgeons of Edinburgh, or the Faculty of Physicians and Surgeons of Glasgow, or of the Royal College of Surgeons in Ireland, as the case may be.

Oral and Practical Examinations will be examined only by that Section.

A Candidate whose qualifications shall be found insufficient will be referred back to his studies, and will not be admitted to re-examination within the period of six months, unless the Board shall otherwise determine.

Examinations will be held in January and June.

The Fee for the Diploma is Ten Guineas, over and above any stamp duty,

Note.—A ticket of admission to the Museum, to the Library, and to the College Lectures, will be presented to each Candidate on his obtaining the Diploma.

### SYLLABUS OF EXAMINATIONS.

In addition to the Special Examination by the Dental Section of the Board of Examiners, Candidates are expected to answer questions in the written and *vivâ voce* Examinations on the following subjects :—

### ANATOMY AND PHYSIOLOGY.

The names of the Bones, and of their more important parts and their articulations.

The names and position of the principal Arteries, Veins, and Nerves.

The form and relations of the Viscera, of the Head, Chest, and Abdomen, and an elementary knowledge of their structure.

An elementary knowledge of the structure and properties of the principal tissues.

An elementary knowledge of the functions of Digestion, Absorption, Circulation, Respiration, Secretion, Motion, and Sensation.

The Surgical Anatomy and Physiology of the Organs of Mastication, Deglutition, Taste, and Articulation.

### PATHOLOGY AND SURGERY.

Inflammation and its consequences.

The healing of Wounds.

The methods of arresting Hæmorrhage.

The union of Fractures.

The signs of Asphyxia, and the treatment of threatened death from Anæsthetics.

The injuries and diseases of the Jaws, Mouth, Fauces, and adjacent parts.

Edward Trimmer, *Secretary.*

## PROFESSIONAL EDUCATION REQUIRED BY THE ROYAL COLLEGE OF SURGEONS OF EDINBURGH.

### PRELIMINARY EXAMINATION.

Candidates for the Dental Diploma must produce evidence of having attained the age of twenty-one years, and will require to produce a Certificate of having passed the Preliminary Examination in General Education required for the ordinary License in Surgery, or an examination equivalent to this, and recognised by the General Medical Council,—except in the case of Candidates who shall have commenced their professional education previous to the first day of August, 1878.

### PROFESSIONAL EXAMINATION.

Candidates will also be required to produce Certificates of having been engaged during four years in the acquirement of professional knowledge, and of having been during that period, or at some time previous to their examination, engaged for not less than three years in the acquirement of a practical knowledge of Mechanical Dentistry with a practitioner registered under this Act.

### LECTURES AND HOSPITAL ATTENDANCE.

The following Lectures and other Courses of Instruction must have been attended by Candidates for the Dental Diploma, at a recognised Medical School or Schools; and the number of Lectures in each of the general courses must correspond with those required for the Surgical Diploma of the College:—

| | |
|---|---|
| ANATOMY | One Winter Course. |
| DISSECTION AND DEMONSTRATIONS, or DISSECTION and | Nine Months. |
| ANATOMY OF HEAD AND NECK | One Course of Twenty Lectures. |
| PHYSIOLOGY | One Course of not less than Fifty Lectures. |
| CHEMISTRY | One Winter Course. |
| SURGERY | One Winter Course. |
| MEDICINE | One Winter Course. |
| MATERIA MEDICA | One Course of Three Months. |
| PRACTICAL CHEMISTRY AND METALLURGY | One Course of Three Months. |

| | |
|---|---|
| Clinical Instruction in Surgery at a Recognised Hospital ... ... ... | One Course of Six Months,<br>or<br>Two Courses of Three Months. |

In addition to these, Candidates will require to have attended the following Special Courses of Lectures and Instruction, in terms of the Curriculum, and by teachers recognised by this College :—

| | |
|---|---|
| Dental Anatomy and Physiology<br>Dental Surgery and Pathology<br>Dental Mechanics ... ... | One course of each. |

Two Years' Attendance at a Dental Hospital or the Dental Department of a General Hospital, recognised by the College.

Candidates who are Licentiates of this College, or who may be registered Medical Practitioners, will require to produce Certificates of Attendance on the special subjects only, and will be examined in these only for the Dental Diploma.

### EXAMINATIONS.

The Dental Examinations shall be both Written and Oral, and be conducted in the same manner as the ordinary Surgical Examinations. These Examinations shall consist of two separate sittings, and be held subsequent to each period of the Ordinary Examinations, on such days as the College may appoint. Candidates must apply to the Secretary of the College on or before the Saturday preceding the Ordinary Examinations, and must then produce all the required Certificates of having passed the Preliminary Examination, and of having attended the Lectures and other prescribed courses of instruction.

### SUBJECTS OF EXAMINATION.

The ordinary subjects of Examination will be Anatomy, Physiology, Chemistry (including Metallurgy), Surgery, Medicine, and Materia Medica ; and the special subjects will be Dental Anatomy and Physiology, Dental Surgery and Pathology, and Dental Mechanics. Anatomy, Chemistry (with Metallurgy), and Physiology, will form the subjects of the first Examination ; Surgery, Medicine, Materia Medica, and the special subjects, those of the second.

### TITLE AND DIPLOMA.

Those Candidates who pass this Examination shall be entitled to the designation of Licentiate in Dental Surgery of the Royal

College of Surgeons of Edinburgh, and shall obtain the Dental Diploma of the Royal College. Each Candidate, before receiving his Diploma shall, in entering his name in the books of the College, sign the following declaration:—

> I hereby promise faithfully to maintain and defend all the rights and privileges of the Royal College of Surgeons of Edinburgh, and to promote its interests to the utmost of my power. I promise, in the event of my admission as a Dental Licentiate of that College, to refraim from advertising or employing any other unbecoming modes of attracting business, and I shall not allow my name to appear in connection with any one who does so. I also promise to obey all the laws of the said Royal College, made or to be made.

### FEES, ETC.

The fee for the Dental Diploma shall be ten guineas. Each Candidate, for the first examination, shall pay to the Secretary of the College the sum of four guineas not later than nine a.m. of the Saturday preceding the ordinary examinations; and in the event of a Candidate being unsuccessful two guineas will be returned to him. Where the Candidate is successful the sum of four guineas will be considered as paid to account of the Diploma. Each Candidate for the second examination shall pay to the Secretary of the College the sum of six guineas not later than nine a.m. of the Tuesday preceding the second examination; and in the event of his being unsuccessful three guineas will be returned to him. No Candidate will, if unsuccessful, be remitted for a shorter period than three months. These Rules will apply to any subsequent rejection.

### EXAMINATIONS SINE CURRICULO.

Candidates who were in practice before the first day of August, 1878, or those not in practice but who had commenced their apprenticeship as Dentists before the first day of August, 1875, and who are unable to furnish the Board of Examiners with the certificates of lectures and hospital attendance required by the foregoing regulations, shall fill in the schedule of application as follows:—

1. Full name, age, and address of Candidate.

2. Certificate of moral and professional character, signed by two registered Medical Practitioners.
3. The date of commencing practice or apprenticeship as a Dentist, and whether, if in practice, such practice has been carried on in conjunction with any other business, and, if so, with what business.
4. Whether he has any Degree or Diploma in Medicine or Surgery, and, if so, from what College or University, or other body, and at what time it was obtained.
5. The particulars of professional education.

The President's Council shall, on such information being afforded them, determine whether or not the Candidate may be admitted to examination for the Dental Diploma, and such examination shall, with the exception of the preliminary examination, and the exemptions in favour of Registered Medical Practitioners, as before explained, be passed on the same subjects and in the same manner as is required for other Candidates, and will confer the same privileges.

The following will be the periods of examination for the year 1884-85:—

### I. PRELIMINARY EXAMINATIONS IN GENERAL EDUCATION.

These examinations will be held in October, 1884. April, July and October, 1885.

### II. FIRST PROFESSIONAL EXAMINATIONS.

On Tuesday, October 21st, 1884.

On Tuesday, January 27th, 1885.

On Tuesday, April 21st, 1885.

On Tuesday, July 14th, 1885.

### III. SECOND PROFESSIONAL EXAMINATIONS.

These will take place after the conclusion of the first professional examinations, at each of the above-mentioned periods. They will generally be begun on the Thursday succeeding the day of the first examination, and in no case on an earlier day.

### SYLLABUS OF EXAMINATIONS.

In addition to a particular acquaintance with Dental Anatomy Physiology, and Surgery, Candidates are expected to possess a general knowledge of, at least, the following subjects of examination:—

#### ANATOMY AND PHYSIOLOGY.

1. The Skeleton in general; the anatomical characters and articulations of the Bones; with the Muscles of the Inferior Maxilla and Upper and Lower Extremities.
2. Names and positions of the principal Blood-vessels and Nerves, and of the Viscera of the Chest and Abdomen.
3. General Anatomy of the Brain and Intercranial Nerves.
4. General knowledge of the functions of Circulation, Respiration, and Sensation.
5. An elementary knowledge of Histological Structures.

#### CHEMISTRY.

1. The Laws of Combination.
2. Sources or preparation and chemical properties of Oxygen, Hydrogen, Nitrogen, Carbon, Sulphur, and Chlorine.
3. A general acquaintance with the Chemistry of Potass, Soda, Ammonia, Iron, Lead, Gold, Copper, Zinc, Arsenic, and Mercury.

#### MEDICINE, SURGERY, AND MATERIA MEDICA.

1. The nature and treatment of Inflammation, Hæmorrhage, Asphyxia, Syncope, Wounds, and Fractures; along with an Elementary knowledge of Disease in general.
2. A general knowledge of the action of Narcotics, Emetics, Purgatives, Depressants, and Stimulants, with examples of the commoner substances used as each, and the modes of their prescription.

JOSEPH BELL, Secretary.

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## PROFESSIONAL EDUCATION REQUIRED BY THE FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.

The regulations of the Faculty of Glasgow do not materially differ from those of the Royal College of Surgeons of Edinburgh.

The Dental Examinations are held in October, January, April, and July.

The *Second Examination* will take place on the day following the First Examination.

ALEXANDER DUNCAN, B.A., Secretary.

## PROFESSIONAL EDUCATION REQUIRED BY THE ROYAL COLLEGE OF SURGEONS IN IRELAND.

After the 1st day of August, 1881 (?), no Candidate shall be admitted to Examination who has not pursued the following curriculum, and lodged with the Registrar of the College, at least a fortnight previous to Examination :—

1. A Certificate of having attained the age of twenty-one years.
2. A Certificate of having been engaged during four years in the acquirement of professional knowledge.
3. Certificates from two Fellows or Licentiates of any College of Surgeons in the United Kingdom, and from two Dentists of repute, testifying that the Candidate is of good character.
4. A Certificate of having passed the Examination in Preliminary Education of one of the Examining Bodies recognised by the General Medical Council.
5. A Certificate of having lodged in the Bank of Ireland, to the credit of the College, the Fee of Ten Guineas, half of which shall be returned to any Candidate who fails to satisfy the Examiners; and no Candidate can present himself for re-examination for six months.
6. Certificates of having attended in a recognised school—
    - One Course of Lectures on Anatomy and Physiology.
    - Two Courses of Dissections, with Demonstrations.
    - One Course of Lectures of Surgery.
    - One Course of Lectures on Chemistry.
    - One Course of Practical Chemistry and Metallurgy.
    - One Course of Lectures on Materia Medica; and
    - Two Coures of Lectures on Dental Surgery, including Dental Mechanics.
7. Certificates of having attended General Hospital Practice for Two Winter Sessions; and the Dental Department of

a General Hospital, or a Special Dental Hospital, for a further period of nine months.

8. A Certificate of having been engaged during, at least, three years in acquiring a practical knowledge of Dentistry, under the instruction of a Registered Licentiate in Dentistry of one of the Licensing Bodies.

The Examinations shall include all the subjects of the foregoing curriculum, and shall be partly Written and partly Oral, preparations, microscopes, and other appliances being used.

Licentiates in Surgery, or Fellows of any College in the United Kingdom, and Graduates in Surgery of any University recognised by this College, will be examined only in subjects special in Dentistry.

The Regulations of the *sine curriculo* examinations, which are still conducted, are as follows:—

The Examinations, up to the 1st day of August, 1881 (?), shall be of a practical character, embracing the Anatomy, Physiology, Surgery, and Pathology of the Teeth, Jaws, and surrounding parts, and Mechanical Dentistry; and shall be partly Written and partly Oral.

All Candidates shall lodge with the Registrar of the College, at least three weeks previous to each Examination:—

1. A Certificate of having attained the age of twenty-one years.
2. Certificates from two Fellows or Licentiates of any College of Surgeons in the United Kingdom, and from two Dentists of repute, testifying that the Candidate is of good character, has been engaged in the practice of Dentistry for at least five years, and has refrained from advertising or other unbecoming modes of attracting business for at least two years previously.
3. A Certificate of having lodged in the Bank of Ireland, to the credit of the College, the Fee of Ten Guineas, half of which shall be returned to any Candidate who fails to satisfy the Examiners.

N.B.—Every successful Candidate, previous to receiving the License, shall declare that he will not advertise, or pursue any other unbecoming mode of attracting business, so long as he holds the License in Dentistry of the College.

John Brennen, Registrar.

## REGULATIONS FOR THE DIPLOMA OF MEMBER
## OF THE
## ROYAL COLLEGE OF SURGEONS OF ENGLAND.

The following will be considered as the commencement of professional education subsequent to registration as a Medical Student :—

1. Attendance on the practice of a Hospital, or other public institution recognised by this College for that purpose.
2. Instruction as the pupil of a legally qualified Surgeon, holding the appointment of Surgeon to a Hospital, General Dispensary, or Union Workhouse, or where such opportunities of practical instruction are afforded as shall be satisfactory to the Council.
3. Attendance on Lectures on Anatomy, Physiology, or Chemistry, by Lecturers recognised by this College.

Candidates, prior to their admission to the First or Primary Examination on Anatomy and Physiology, will be required to produce the following Certificates, viz. :—

1. Of having, prior to the commencement of professional study, been registered by the General Medical Council.
2. Of having attended Lectures on Anatomy during two Winter Sessions.
3. Of having performed Dissections during not less than two Winter Sessions.
4. Of having attended Lectures on General Anatomy and Physiology during one Winter Session.
5. Of having attended a Practical Course of General Anatomy and Physiology during another Winter or a Summer Session, consisting of not less than thirty meetings of the Class.

The Student is required to pass an Examination by his teachers in Elementary Anatomy and Physiology at least six months before presenting himself for this Examination. This testing of elementary knowledge should be passed at the end of the first Winter Session.

The *subjects* of the Primary Examination are :—

Anatomy and Physiology.

The Fee is Five Guineas.

Candidates, prior to their admission to the Second or Pass Examination on Surgical Anatomy and the Principles and Practice of Surgery, Medicine, and Midwifery, will be required to produce the following Certificates, viz. :—

1. Of being twenty-one years of age.
2. Of having been engaged, subsequently to the date of registration by the General Medical Council, during four years, or during a period extending over not less than four Winter and four Summer Sessions, in the acquirement of professional knowledge.
3. Of having attended Lectures on Surgery during one Winter Session.
4. Of having attended a Course of Practical Surgery during a period occupying not less than six months prior or subsequent to the Course required by the preceding Clause 3.
5. Of having attended one Course of Lectures on each of the following subjects, viz. :—
    Chemistry.
    Materia Medica.
    Medicine.
    Forensic Medicine.
    Midwifery (with practical instruction, and a Certificate of having personally conducted not less than ten labours).
    Pathological Anatomy during not less than three months.
6. Of having studied Practical Pharmacy during three months.
7. Of having attended a three months' course of Practical Chemistry (with manipulations) in its application to Medical Study.
8. Of Instruction and Proficiency in the practice of Vaccination.
9. Of having attended, at a recognised Hospital or Hospitals, the Practice of Surgery, during three Winter and two Summer Sessions.
10. Of having been individually engaged, at least twice in each week, in the observation and examination of Patients at a recognised Hospital or Hospitals, under the direction of a recognised Teacher, during not less than three months.

11. Of having, subsequently to the first Winter Session of attendance on Surgical Hospital Practice, attended, at a recognised Hospital or Hospitals, Clinical Lectures on Surgery, during two Winter and two Summer Sessions.
12. Of having been a Dresser at a recognised Hospital, or of having, subsequently to the completion of one year's professional education, taken charge of Patients under the superintendance of a Surgeon during not less than six months, at a Hospital, General Dispensary, or Parochial or Union Infirmary recognised for this purpose, or in such other similar manner as, in the opinion of the Council, shall afford sufficient opportunity for the acquirement of Practical Surgery.
13. Of having attended during the whole period of attendance on Surgical Hospital Practice (see Clause 9) demonstrations in the Post-Mortem Rooms of a recognised Hospital.
14. Of having attended, at a recognised Hospital or Hospitals, the Practice of Medicine, and Clinical Lectures on Medicine, during one Winter and one Summer Session.

The *subjects* of the examination are :—

Surgical Anatomy.
Principles and Practice of Surgery.
Medicine.
Midwifery.

The Fee for the Membership is £22, but the fee of Five Guineas, paid prior to the Primary Examination, is allowed in the fee for the Pass Examination.

## SPECIAL DENTAL SCHOOLS.

### THE DENTAL HOSPITAL OF LONDON, LEICESTER SQUARE.

#### DENTAL ANATOMY AND PHYSIOLOGY.

By Arthur Underwood, M.R.C.S., L.D.S.Eng.—On Wednesdays and Fridays, at 8 a.m., during the Summer Session.

#### DENTAL SURGERY AND PATHOLOGY.

By ————. On Tuesdays and Thursdays, at 8 a.m., during the Summer Session.

### DENTAL MECHANICS.

By Joseph Walker, M.D., &c.—On Wednesdays, at 5 p.m., during the first half of the Winter Session.

### METALLURGY.

By Prof. A. K. Huntington.—On Tuesdays and Fridays, at 12 o'clock, during the first half of the Winter Session.

Fees for two years' Hospital Practice and the Lectures, £31 10*s.*

MORTON SMALE, Dean.

## NATIONAL DENTAL HOSPITAL AND COLLEGE, GREAT PORTLAND STREET.

### DENTAL ANATOMY AND PHYSIOLOGY.

By Thomas Gaddes, L.D.S.Eng. and Edin.—On Tuesdays and Thursdays, at 7 p.m., during October, November and December.

### DENTAL SURGERY AND PATHOLOGY.

By Willoughby Weiss, L.D.S.Eng.—On Tuesdays and Thursdays, at 6 p.m., during May, June, and July.

### DENTAL MECHANICS.

By Harry Rose, L.D.S.Eng.—On Mondays, at 7 p.m., during January, February, and March.

### DENTAL METALLURGY.

By Alfred Tribe, F.I.C., F.C.S.—On Tuesdays, at 9 a.m., during January, February, and March.

### OPERATIVE DENTAL SURGERY.

By W. St. George Elliott, M.D., D.D.S.—On Wednesdays, at 7 p.m., during November and December.

### DEMONSTRATIONS IN DENTAL MECHANICS.

By W. R. Humby, L.D.S.Eng.—On Wednesdays, at 7 p.m., during January, February, and March.

### THE ELEMENTS OF HISTOLOGY.

By Thomas Gaddes, L.D.S.Eng. and Edin.—On Wednesdays and Fridays, at 7 p.m., during May, June, and July.

### ARTS AND LITERATURE CLASS.

Conducted by the Rev. H. R. Belcher, M.A., D.C.L.

Fees for two years' Hospital Practice and the Lectures, £25 4*s.*

THOMAS GADDES, Dean.

## MANCHESTER DENTAL HOSPITAL, 78, GROSVENOR STREET.

### LECTURERS.

On "Dental Surgery and Pathology," by ———.
On "Dental Anatomy and Physiology," by ———.
On "Operative Dental Surgery," by A. C. Farnsworth, L.D.S.I.
On "Dental Mechanics," by ———.
On "Dental Metallurgy," by H. C. Smale, L.D.S.Eng.
Fee to Lectures, one course, £8 8*s*.
Fee to Lectures, double course, £14 14*s*. (required for Diploma of R.C.S.Eng.
Fee to Dental Practice at Hospital, £5 5*s*. per annum.
Fee to Special portion of Dental Curriculum of the Royal College of Surgeons of England, 24 guineas.
The Fees for the General Subjects at Owen's College amount to £60 14*s*. 6*d*.

Mr. THOS. NORTH, 96, Bloomsbury, C.-on-M., Manchester,
Honorary Secretary.

## OWEN'S COLLEGE, MANCHESTER.

It is proposed to organise a complete course in Dental Surgery in the Session 1884-5, such as will enable Students to prepare for the examinations of the Royal College of Surgeons for the Licence in Dental Surgery. A separate prospectus of this department will be issued as soon as the arrangements have been completed.

## QUEEN'S COLLEGE, BIRMINGHAM, AND BIRMINGHAM DENTAL HOSPITAL.

The teaching of Dentistry is now undertaken by the Queen's College, acting in association with the Birmingham Dental Hospital and the Birmingham Clinical Board, so that Students may fully qualify themselves for the Dental Diploma of the Royal College of Surgeons.

The Dental Hospital is centrally situated, near the College, and is open daily (Sundays excepted). The number of patients treated in 1883 was upwards of 7,000.

DENTAL ANATOMY AND PHYSIOLOGY.

By F. R. Batchelor, L.D.S.I.—On Thursdays, at 5 p.m., during the Winter Session.

DENTAL SURGERY AND PATHOLOGY.

By Thomas Hawkins, M.R.C.S.—On Fridays, at 5 p.m. during the Winter Session.

DENTAL MECHANICS.

By Charles Sims, L.D.S. Eng.—On Wednesdays, at 5 p.m., during the Summer Session.

DENTAL METALLURGY.

By W. A Tilden, F.R.S., D.Sc.—This class will be held at Mason College, at 2.30 p.m., from October till Christmas.

A Composition Fee of Sixty Guineas, payable in one sum, or in two sums, viz : Forty Guineas at the beginning of the first year, and Twenty Guineas at the beginning of the second year of studentship, admits to the full curriculum required for the Dental Diploma (*inclusive of the necessary Hospital Practice*). Any additional attendance will be charged for according to the general conditions.

The Rev. W. H. Poulton, M.A., Warden.

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## UNIVERSITY COLLEGE, LIVERPOOL, & LIVERPOOL DENTAL HOSPITAL, MOUNT PLEASANT.

The entire Curriculum can be completed at these two Schools.

DENTAL ANATOMY AND PHYSIOLOGY.

By E. T. Paul, F.R.C.S.

DENTAL SURGERY.

By E. J. M. Phillips, M.R.C.S., L.D.S.Eng.

DENTAL MECHANICS.

By R. E. Stewart, L.D.S.Eng.

DENTAL METALLURGY.

By E. A. Councell, L.D.S.Eng.

Fees for Dental Hospital Practice.—Five Guineas per annum for all Students who are not taking out the full Curriculum ; Four Guineas for full Students at these schools.

Composition Fee.—A payment of Fifty Guineas on entrance, or in two equal instalments (one-half on entrance and the remainder within twelve months), entitles the Student to attendance on all Lectures and Demonstrations (Medical and Special) required for the Licence of the College of Surgeons. The fees for the Practice of the two Hospitals amount to £23 2*s.* The total expenditure for the whole Curriculum is £75 12*s.*

Frederick Rose, Hon. Sec. to Medical Board.

## DENTAL DISPENSARY AND SCHOOL, OCTAGON, PLYMOUTH.

### DENTAL ANATOMY.

By F. H. Balkwill, L.D.S. Eng.

### DENTAL PHYSIOLOGY.

By C. Spence Bate, F.R.S., &c.

### DENTAL MECHANICS.

By W. V. Moore, L.D.S. Eng.

The Fee for Lectures and Dispensary Practice is £23 2*s.*

E. G. Bennett, Hon. Sec.

## DENTAL HOSPITAL OF EXETER, BEDFORD CIRCUS.

Attendance on the practice of this Hospital is recognised by the Royal College of Surgeons of England as qualifying for their Dental Diploma. Pupils of any Member of the Staff, or other Registered Practitioner (being a Life or Annual Governor), are permitted to attend the practice of the Hospital, subject to the approval of the Medical Sub-Committee, on payment of Five Guineas annually to the funds of the Institution.

Henry B. Mason, Hon. Secretary.

## EDINBURGH DENTAL HOSPITAL AND SCHOOL, CHAMBERS STREET.

### DENTAL ANATOMY AND PHYSIOLOGY.

By Andrew Wilson, L.D.S.Edin.—On Tuesdays and Fridays, at 8 p.m., commencing November 11th.

### DENTAL SURGERY AND PATHOLOGY.

By George W. Watson, L.D.S.Edin.—On Tuesdays and Fridays, at 8 p.m., commencing May 5th, 1885.

### MECHANICAL DENTISTRY.

By W. Bowman Macleod, L.D.S.Edin.—On Wednesdays, at 8 p.m., commencing November 12th.

### PRACTICAL MECHANICS.

Assistant Demonstrator.—J. Stewart Durward, L.D.S.Edin. The Demonstrations will be spread over the two years of Hospital Practice, and will be given as occasion serves.

Fees: For Hospital Practice, £15 15*s.*; Lectures, £9 15*s.*; total, £25 10*s.* This does not include the fee of £2 4*s.* for second courses of lectures required by the Royal College of Surgeons of England.

W. Bowman Macleod, Dean.

## ANDERSON'S COLLEGE, DENTAL HOSPITAL AND SCHOOL, GLASGOW.

### DENTAL ANATOMY AND PHYSIOLOGY.

By David Taylor, M.D., L.D.S.Glas.—On Wednesdays and Fridays, at 8 a.m., during Summer Session.

### DENTAL SURGERY AND PATHOLOGY.

By J. R. Brownlie, L.D.S.Eng.—On Tuesdays and Thursdays, at 8. am., during Summer Session.

### MECHANICAL DENTISTRY.

By W. S. Woodburn, L.D.S.Glas.—On Thursdays, at 8 p.m., during Winter Session.

Fee for two years' Hospital Practice is £10 10*s.*; for the three Courses of Dental Lectures £2 2*s.* each.

The Fee for the General Subjects is £25 14*s.* 6*d.*—Total, £42 10*s.* 6*d.*

Dr. A. M. Buchanan, Dean.

## DENTAL HOSPITAL OF DUBLIN, BERESFORD PLACE.

The Fee for Dental Practice is £3 3*s.* for one Session, and £5 5*s.* for two Sessions.

H. G. Sherlock, Hon. Sec.

## GENERAL MEDICAL SCHOOLS.

### BARTHOLOMEW'S HOSPITAL, SMITHFIELD, E.C.

Fee for General Subjects for Students of Dental Surgery:—First Winter, 31½ guineas; First Summer, 31½ guineas; or a single payment of 63 guineas.

NORMAN MOORE, M.D., Warden.

### CHARING CROSS HOSPITAL, W.C.

The Composition Fee for Dental Students is £42 2*s.* This may be paid in two instalments of £22 2*s.* and £20, at the commencement of each Winter Session respectively.

FRANCIS HIRD, Dean.

### GUY'S HOSPITAL, BOROUGH, S.E.

Fee for attendance on the Hospital Practice and Lectures required for the Dental Diploma of the College of Surgeons, 63 guineas, or in two annual instalments of 40 guineas and 23 guineas. The above fee does not include £1 10s. for Practical Chemistry.

Dr. F. TAYLOR, Dean.

### KING'S COLLEGE, STRAND, W.C.

No special arrangements are made for Dental Students.

Prof. CURNOW, Dean.

### LONDON HOSPITAL, MILE END, E.

Composite Fee for Dental Students.—Hospital Practice and Lectures, £42. This does not include the fee of £2 2*s.* for Practical Chemistry.

MUNROE SCOTT, Warden.

### MIDDLESEX HOSPITAL, BERNERS STREET, W.

Students who intend to become Licentiates in Dental Surgery of the Royal College of Surgeons are admitted to attend the requisite Courses of Lectures and Hospital Practice on payment of a fee of 40 guineas, in one sum on entrance, or by instalments of £30 on entrance, and £15 at the beginning of the second Winter Session.

ANDREW CLARK, Dean.

## ST. GEORGE'S HOSPITAL, GROSVENOR PLACE, S.W.

Fee for General Subjects required for the Diploma in Dental Surgery, including Practical Chemistry, £55; payable in two instalments:—First year, £30; second year, £25.

Dr. Wadham, Dean.

## ST. MARY'S HOSPITAL, PADDINGTON, W.

Entrance Fee to the General Hospital Practice and Lectures required for the examination in Dental Surgery at the Royal College of Surgeons, England, £55—payable in two instalments, First year, £30; Second year, £25. George P. Field, Dean.

## ST. THOMAS'S HOSPITAL, ALBERT EMBANKMENT, S.E.

The Fee for attendance on the General Subjects required of Students in Dental Surgery is, for the two years, £55; or by instalments, £50 for the first year, and £10 for the second year.

G. Rendle, Secretary.

## UNIVERSITY COLLEGE, GOWER STREET, W.C.

No special arrangements are made for Dental Students.

Prof. Berkeley Hill, Dean.

## WESTMINSTER HOSPITAL, BROAD SANCTUARY, S.W.

The Fees for the General Surgical Practice and Lectures required for the Dental Diploma of the Royal College of Surgeons may be paid in one of two ways, viz.:—1. In one payment on entrance, £50. 2. In two payments of £32 10*s*. and £20, to be made respectively at the commencement of each academic year. These payments include the Library Fee, and entitle the Student to attendance on the Tutorial Classes.

Dr. de Havilland Hall, Dean.

## SCHOOL OF MEDICINE, SURGEONS' HALL, EDINBURGH.

The Fees for the General Subjects (including practice at the Royal Infirmary) required of Dental Students, according to the Curriculum of the Royal College of Surgeons of Edinburgh, amount to £38 10*s*. Stevenson Macadam, Secretary.

## ANDERSON'S COLLEGE, GLASGOW.

The Fees for the General Subjects required of Dental Students, as prescribed by the Curriculum of the Faculty of Physicians and Surgeons of Glasgow, amount to £25 14*s*. 6*d*. And the Fees for the Special Dental portion of the Curriculum, including £10 10*s*. for Dental Hospital Practice, are £16 16*s*.—total, £42 10*s*. 6*d*.

Dr. A. M. Buchanan, Dean.

# ELECTRICITY: AND THE ELECTRIC LIGHT: IN REFERENCE TO DENTISTRY AND SURGERY.

By C. J. BOYD WALLIS, L.D.S. Eng., &c.

## PART XI.—RHEOPHORES, ELECTRODES.

IN order to make more clear the application of the terms electrode and rheophore a brief reference to allied terms will be made.

ANODE is the positive electrode or pole of a battery, that is, the upper or exposed portion, the wire or plate connected to the copper or other negative element of a battery: the wire which leads the + current into a solution to be decomposed, and at which are set free the oxygen, acid radicals, and all — ions (anions). In electro-metallurgy it is usually formed of the metal to be deposited, and is then called the soluble anode or pole.

CATHODE is the opposite to the anode: it is the negative electrode or pole of a battery, the wire connected to the zinc, the plate at which, in any decomposition cell, the cations or + ions are set free. In electro-metallurgy it is the object upon which the deposit is to be formed.

POLES.—The name of the wires, plates, &c., leading *from* the battery is the opposite to that of the plate they lead from: thus the zinc is the positive metal, plate, or element of the battery, but the wire leading from the zinc is the *negative* or — *pole*: hence we have the copper, the negative element, plate, or metal, but the wire leading from it is the *positive* or + *pole.*

IONS.—A term Faraday applied to the two parts into which an electrolyte breaks up. They may be taken as *radicals*, and may be either single atoms of elements, double atoms which still act as one chemically, or they may be compound radicals, like cyanogen, ammonium, and the radicals of acids. They are of two classes, named according to the electrode at which they appear: but the same radical may be an anion at one time and a cation at another, according as it is united with a radical more or less high in the order of affinity.

ANION is the electro-negative, acid or chlorous, radical of the salt or acid decomposed. Oxygen, acid radicals, as chlorine, are anions.

CATION.—Electro-positive elements and radicals, which are set free in electrolysis at the cathode. Hydrogen and metals in the order of the electric series are cations.

Electrodes.—A term applied by Faraday to the wires, plates, or poles leading the current into and out of a cell; and to distinguish them, that by which the current enters is called the *anode*, that by which it leaves the *cathode*.

Rheophores for medical and surgical purposes are of various shapes and sizes, designed according to the purpose for which they are required. The following excellent designs, manufactured by Messrs. Maw, Son & Thompson, may be taken as types of the various kinds now in use.

The familiar plain metal cups with sponges should be excluded from the list, for they are both dirty and unsatisfactory, since they form copper salts, which impart a very disagreeable and repulsive green discolouration to the sponge. Where sponge-holders are employed plated metal should be used, or preferably vulcanite or wooden holders. But far superior to the sponge-holders are the carbon rheophores. These consist of a carbon disc, enclosed in a cover of wash leather or flannel, to which may be added, if desired, a layer of fine sponge. These are shown in Fig. 44, where four carbon rheophores are illustrated which fit into one handle. Among the advantages of the carbon rheophores may be mentioned, firstly, that they may be applied and pressure used without the risk of drenching the patient with an overflow of water; and, secondly, without causing pain to the patient by bringing the metallic cup in contact with the skin, as is sometimes the case with the ordinary sponge-holders. Both sponges and wash leather coverings should be changed and well washed for each patient, in order to avoid the risk of conveying the disease of one patient to another.

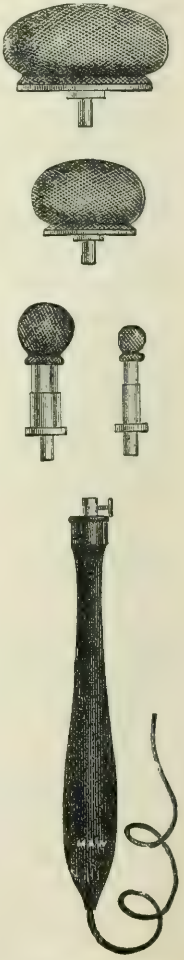

Fig. 44.—*Carbon Rheophores.*

Plates of lead and tin make excellent rheophores, as they are so easily bent and adapted to the shape desired to fit any part of the body. They should be well covered with flannel or wash leather, and moistened with water when used.

The size of the surface of rheophores is an important point. Professor Erb gives the following list of sizes for standard rheophores :—

| | | |
|---|---|---|
| 1. | Fine rheophore | ... $\frac{1}{2}$ cm. ($\frac{1}{5}$ inch diameter). |
| 2. | Small ,, | ... 2 ,, ($\frac{3}{4}$ inch). |
| 3. | Medium ,, | ... 5 ,, square, or 7·5 diameter (2 in., 3 in.). |
| 4. | Large ,, | ... 6 × 12 cm. (2½ × 5 in.). |
| 5. | Very large ,, | ... 8 × 16 ,, or more. |

The "fine" rheophore, similar to Fig. 45, is used in electro-diagnosis for applying the current to the motor points, small nerves or muscles.

The "small" in diagnosis for the excitation of the larger nerves and muscles.

The "medium" is useful for the examination of larger muscles, and in therapeutics for applications to the face, the neck, the limbs, &c.

The "large" is used for galvanisation of the spinal cord, of large muscles, deep structures, and joints.

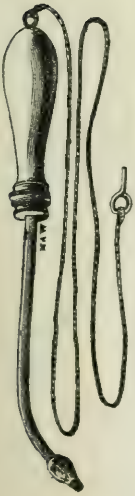

Fig. 45.

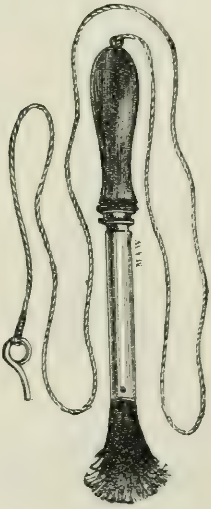

Fig. 46.

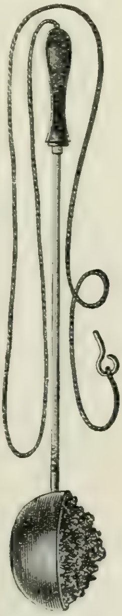

Fig. 47.

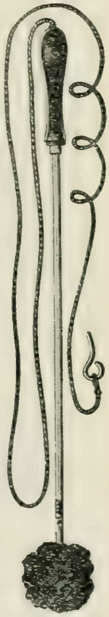

Fig. 48.

The "very large" is used for similar purposes as the "large," when the patients are stout, or strong currents are necessary.

When in use, the sponges or covering of the rheophores should be moistened with a little water, cold or tepid; and when the battery is weak a little salt should be added to the water, which should then be used warm. A few drops of aromatic vinegar added will make it agreeable and increase the conductivity.

*Dry rheophores* are employed for the purpose of cutaneous faradization, and usually consist of a metallic brush similar to Fig. 46.

There are many forms of rheophores designed for special purposes. The most important are shown in the following illustrations:—

Fig. 45. For the ear.

Fig. 46. For the spine, &c.

Figs. 47 and 48. For application under a loose dress.

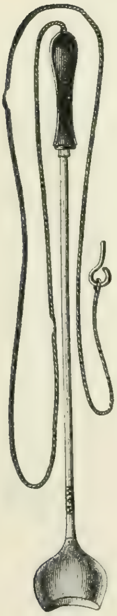

Fig. 49.

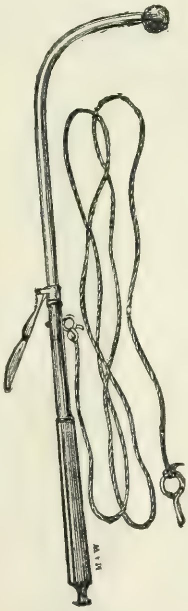

Fig. 50.

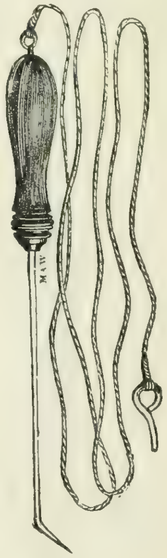

Fig. 51.

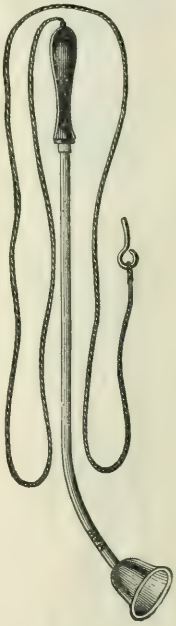

Fig. 52.

Fig. 49. For the eye, with a cup to hold water.

Fig. 50. For the throat.

Fig. 51. For the teeth.

Fig. 52. Bell-shaped rheophore for the uterus.

Fig. 53. For the rectum and vagina.

Fig. 54. Needles for electrolysis.

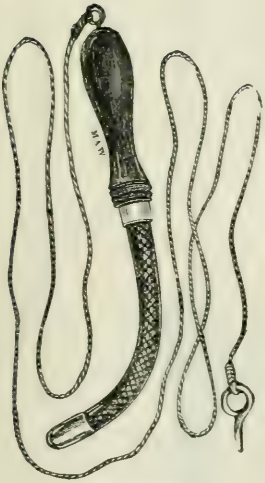

Fig. 53.

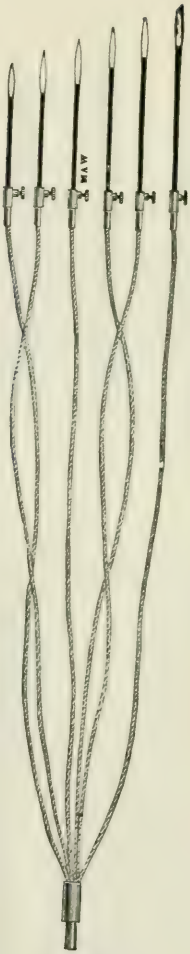

Fig. 54.

Figs. 55 to 62, inclusive, are instruments for the application of the galvanic cautery. Fig. 55 is a convenient form of holder, with a removable cauterizer attached. This latter consists of a porcelain cone supporting a coil of platinum wire; into the holder the other instruments fit.

Fig. 63. For application to the spine and the large muscles of other parts of the body; for sciatica, &c.

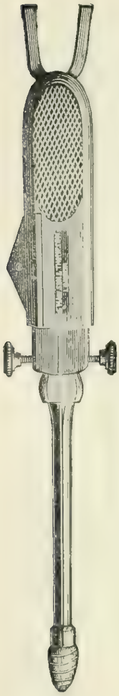

Fig. 55.

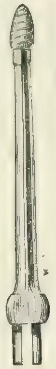

Fig. 56.

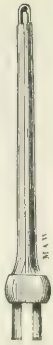

Fig. 57.

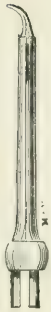

Fig. 58.

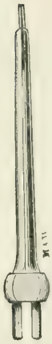

Fig. 59.

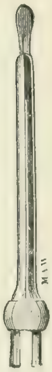

Fig. 60.

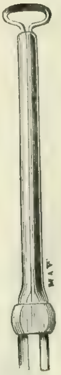

Fig. 61.

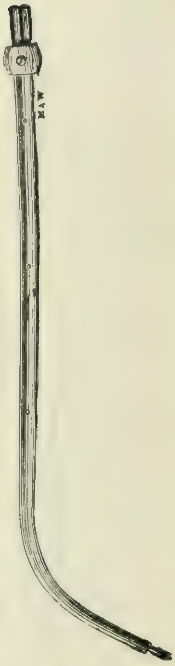

Fig. 62.

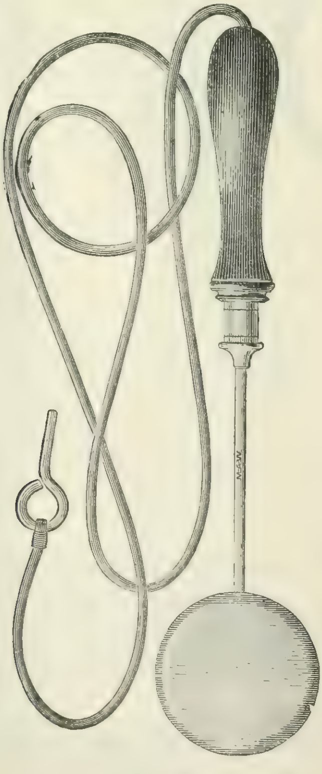

Fig 63

## BRITISH DENTAL ASSOCIATION.

### WESTERN BRANCH.

The Annual Meeting of this Branch was held at Torquay, on August 2nd. Owing to the absence of the retiring President (Mr. Charles Gaine), the President-elect (Mr. W. A. Hunt) occupied the chair.

It was decided to hold the next Annual Meeting in Hereford, and that Mr. McAdam be President-elect.

A question arose as to the eligibility of Mr. Washbourne to a place on the Council of the Branch, on account of his publishing the following advertisement:—

"Mr. Norman Washbourne, Bridge House, Taunton, visits Minehead on the third Monday in each month, at Mr. Floyd's, 2, Wellington Square. The next visit will be on August 18th. He also visits Williton on the second Monday in each month, at the Post Office, Mr. Hales'; his first visit being on September 8th. Hours 10 to 4. Appointments can be made by writing previously to Bridge House, Taunton."

Mr. Browne-Mason said this was not an advertisement that could be objectionable, from the simple fact that the gentleman did not even mention his profession. It seemed to him an announcement that was justifiable; but seeing Mr. Smith-Turner present, he should like to hear what he had to say on the subject, as his was an opinion that would have much weight.

Mr. Smith-Turner said the answer to this question was not to be given in a few words. They knew that the object of this Association was to raise not only the social status, but the moral tone of their profession, and one of their great purposes was to discourage a certain mode of advertising which was quite unprofessional. Any body of men claiming to be professional men must be prepared to give up what might be regarded as a lucrative practice, if it was necessary that they should do so, to secure a higher social status. The system of advertising generally pursued was of a very objectionable character, but it seemed to him that an announcement of the kind just read could not be prohibited by any Association without seriously interfering with what might be termed the liberty of the subject. This gentleman did not say what was his profession, or what was the object of his visit, but simply stated that he would visit a certain place at a certain time. It was simply a personal announcement by the gentleman for the convenience of his patients and the public generally. He could not see that it affected his professional position in any way, or his right to be appointed to the Council, or the wisdom of the Council in nominating him. If there were no advertisements of any other kind than these to trouble them their position would be a very happy one indeed. He did not look upon this advertisement as having any objectionable feature, and did not think the Odontological Society would interfere with it.

The President said he was very glad indeed to find that his own opinion coincided with that of Mr. Smith-Turner. He had been asked his opinion on the matter, and had given it in very similar terms. Now, although the gentleman in question might be perfectly justified in publishing this announcement, yet he thought that it was a course the members at large would rather not see adopted. He was glad to say that he believed that if a little influence were used these announcements would not be seen in the future.

Mr. Smith-Turner thought it said a great deal for the Association that it had been able in so short a time to infuse so wholesome a spirit in the profession. They must not forget what they had been in their efforts to strive to make themselves something different.

The President (Mr. Hunt), in his inaugural address, considered the Dental profession a scientific profession, undergoing healthy consolidation from day to day.

Dental surgery has with us, until very lately, been passing through its embryonic condition, and yet it needs much careful attention; but in spite of advertisements steeped in falsehood, the genuine services of the educated and competent Dental Surgeon are more than ever in request, and will continue to be so as civilisation advances, and as the true and close relationship of sound teeth to health and enjoyment is better understood. Many of the false lights of quackery will go smokily out; and the true light will be more clearly recognised, and more unhesitatingly followed.

So, then, there is every reason why we should march forward hand in hand with the spirit of progress and true science.

But it has been the nature of scientific truth in the past to unfold herself slowly, rather than by leaps and bounds. She needed diligent inquiry before she yielded herself up. Indeed, as a rule, the beginnings of science are not sudden and palpable, but slow and insensible. Mr. Hunt then referred to the works of John

Hunter, published in 1778, of Joseph Fox, of Thomas Bell, of Nasmyth, and of (now) Sir Richard Owen, K.C.B. He dwelt upon these points to demonstrate, by means of the dates given, the slow and gradual unfolding of the truth in the past. As relates to our calling, antiquity has given us nothing, except what to avoid. Now the torch seems fully ablaze, and the world has been further enriched by the publication of the works of Messrs. Tomes (father and son), and some other valuable publications which will occur to us all. Moreover, "a wave of progress" has reached this country from the other side of the Atlantic which has had its stimulus upon us, and has raised an increasing demand for, and appreciation of our services.

To education, broad as well as technical, Mr. Hunt looks for the elimination of the false and worthless from our ranks, rather than to all the Acts of Parliament that have been or ever will be. Next, therefore, to compulsory registration, let us rank the Preliminary Examinations in the subjects of an English gentleman's education, a knowledge of which no man who has any wish to secure social recognition can afford to be without, and which is now happily compulsory on all who shall henceforth enter our ranks.

In truth, he continued, the current of knowledge and improvement rushes on so swiftly that those who hesitate to commit themselves to it will soon be left far behind, and serve only the ignoble purpose of enabling us to measure the force and rapidity of the stream. Our own individual credit, and the honour and reputation of our body, demand that we should not be wholly ignorant of the other departments of the healing art, and in general science, history, antiquities, music, the fine arts, &c., as our individual tastes prompt us, we should be students.

Let us each, then, strain every nerve, not only to advance the branch of the profession we have chosen, but to advance our own individual culture as much as we can ; thus shall we enjoy the greatest pleasure which upright and honourable minds can conceive—that of increasing the *usefulness*, and thereby raising the credit and respectability, of the body to which we belong, and so prepare for ourselves, at all times, a pure source of the most satisfactory reflections.

Mr. W. V. Moore then read a paper on "The Condition of the Tonsils affecting the Teeth." The gist of the argument was that an unhealthy condition of the tonsils often promotes caries, and also pain and inflammation of the gums. Mr. Moore mentioned cases which had come under his notice at the Plymouth Dispensary, and stated the remedies he had employed.

Mr. Pearman showed two geminated temporary teeth, the right upper central and lateral, which he had extracted from the mouth of a little girl six and a-half years old.

Mr. Balkwill related the particulars of a case of transplantation. In May last a young lady had her first upper right bicuspid taken out because there was not room for the canine. Her mother said, "what a pity it is to take it out—it's not a bit decayed." He said "yes," and added that if her sister had a corresponding tooth which was decayed it would be well to change it. Curiously it was a fact that the corresponding tooth in the sister had been troubling her for some little time, and on looking at the upper right bicuspid in the sister's mouth he discovered that although there was not actually a fistula there was a red place. Under gas he took out the decayed tooth from the elder sister, inserted in its place the sound tooth he had taken from the younger sister, pressed it up and kept it firmly there with his finger for five minutes (he preferred this to any attachment, or plate, or tying in afterwards) told her to keep her teeth tight shut for a time and be careful in eating for the next few days. He saw the case a week after; it was a little tender but doing well. He saw it a fortnight since when it was almost as tight as the other teeth. The threatened alveolar abscess had completely disappeared, and everything was looking as healthy and satisfactory as it could be.

The President remarked that there were numberless cases on record of teeth accidentally knocked out being replaced, not by an educated dentist even, but by by-standers, and there had been actual re-union of the vessels, pulp and nerves. When a tooth was taken out it did not at once die, the vessels had vitality for some hours afterwards. He did not think there was any necessity to remove the pulp from a living tooth which had lost its connection with its socket.

Mr. Keys said the cases mentioned by the President were of teeth restored to the places from which they had been removed—they were different from the case of a tooth taken out of one mouth and placed in another. He did not think the cases analogous, because where there was a transfer they would never get a perfect fit.

The President said his remarks applied only to healthy teeth. As to the point just raised by Mr. Keys, of course the cases he had mentioned were not quite analogous to the one under discussion, but it must be remembered that not only would teeth grow when transplanted from one mouth to another, but, as was well known, there was the instance of teeth being transplated to the comb of a cock where they grew and thrived. The whole question was a very interesting one, and he regretted that there was not time to discuss it further.

Mr. Keys presented a model showing the plan he adopted for protecting pivot holes in plaster models. He had had trouble in putting pivots into gold plates, and the plan he adopted got over the difficulty. The device which he illustrated, consisted of placing a zinc tube over the wires in the Stent's impression, and the tubes being left in the plaster cast protection was given throughout the entire process. The idea, as illustrated by the models, was generally approved of.

Mr. Browne Mason pivoted a front tooth in the manner referred to as Mr. Sheffield's. Subsequently Mr. Verrier gave his demonstration of continuous gum work, and Mr. Briggs showed Dr. Campbell's vulcanizer and celluloid apparatus.

In the evening the members dined together at the Imperial Hotel.

## ASSOCIATION MEETING.

The Fourth Annual General Meeting of the British Dental Association was held in Edinburgh, on August 28th, 29th and 30th, the Royal College of Surgeons of Edinburgh having kindly granted the use of their Library and Hall for the purposes of the meeting.

The proceedings began with a reception in the Museum of the College, by Dr. John Smith, President of the College of Surgeons, and by the Lord Provost of Edinburgh, Sir George Harrison, L.L.D. After luncheon, which was served in an ante-room, demonstrations and exhibits of instruments, &c., engaged the attention of members; and in the evening there was a gathering of members and their friends at the Forestry Exhibition.

The second day was devoted to the more important business, commencing with a Meeting of the Representative Board, at 9 a.m. Demonstrations also began at the same hour. At 10.30, the General Meeting was begun, Mr. J. Smith Turner, vice-president, occupying the chair in the absence of the retiring president, Mr. C. Spencer-Bate, F.R.S.

Mr. John Tomes, F.R.S., President of the Representative Board, had prepared an address which was read at the meeting of the Board, and it was decided that it be also read to the general assembly.

In referring to the lately-withdrawn Medical Bill, Mr. Tomes remarked that the Dental section was of advantageous importance to them. One result of its passing would have been the repeal of a provision introduced in the Dentist's Act rendering the consent of the Medical Council a necessary antecedent to a prosecution under section 4 of the Act. The question of direct representation in the Medical Council, so much agitated for by medical practitioners, and in the bill to some extent conceded, was, as respects Dental practitioners, brought before the Royal Commission and considered with a result that, taking into account the very recent legal recognition of the Dental profession, as such, might have been foreseen. While, as the decision of the Royal Commission would indicate, the Licentiates were for the present sufficiently represented, those who held no registrable educational qualification were not unrepresented. Legislation would not, indeed could not, afford a remedy for this evil, but education and association will tend to its diminution; and the increasing prosperity of their Dental schools, brought into action by legislation, bade them hope that a professional nuisance which never could be wholly removed would be brought into much narrower limits, and its practice confined to the few meaner spirits whose presence in their ranks might be regretted but could not be prevented. Those who lived on might see, and he would venture to predict would see that, happen what might, their Act if rightly used by themselves, was sufficient, and that the proposed amendments, though desirable, were of relatively small account as respects the general results. No fault had been found with the strictly educational clauses or with the manner in which effect had been given to them by the Medical Council, and therein lay the strength of their social and professional position. If full force were given to these, they might regard lightly the mere prohibitory sections of the Act. Education was the highest form of protection. This secured, its posessor might defy the charlatan whom many contend should be put down by the strong hand of the law. The Government steadily refused to make the act of medical practice by unqualified and unregistered persons penal. The most that could be obtained was the prevention of their use of the title of the qualified, their establishment of a claim for pecuniary remuneration for attendance, or their appointment to any medical office whatever. And with this the medical profession and its Dental branch must be content.

Mr. Hutchinson, in the place of Mr. Oakley Coles, read a report of the Dental Benevolent Fund Committee. It was stated that it was in contemplation of the Dental Hospital of London and of the National Dental Hospital to found Scholarships to enable boys who turn out good students to receive free education at these dental hospitals. Also that Sir Edwin Saunders, as a trustee, had been instructed to invest the sum of £500, and that he had done so in 2½ per cent. Consols, the sum amounting now to £535 8s. 9d. The report was adopted.

Mr. Parkinson, the treasurer, stated that their balance in bank amounted to £528. He was sorry to add that they had at the same time 135 unpaid subscriptions for one year, and two years there was thirty subscriptions unpaid. Mr. Canton, the hon. secretary, submitted the fifth annual report, which stated that there was an increase in every direction. Since the last meeting at Plymouth there had been one prosecution—the Association *v.* Halford—and a Scottish case was coming up in October. During last year another branch had been added to the Association—the West of Scotland branch, this being now the fifth branch. The membership of the Association now numbered 536, showing an increase of 42 ; and in addition to that six members were elected on the opening day to the Scottish branch, and four yesterday, making the increase 52 members. It was agreed, that the next meeting of the Association should be held in Cambridge, on August 27th, 28th and 29th, and Mr. White, Norwich, president of the Eastern Counties Branch, was nominated president-elect. The meeting endorsed the action of the Representative Board in removing the name of Mr. Partridge, London, from the list of members, for alleged "disreputable advertising," after remonstrances by the Board. It was reported that a Central Counties Branch was being formed, Birmingham being the centre, and that already a large number of names had been received.

The Chairman then read the President's valedictory address. Mr. Bate observed that he felt no misgiving as to the success of the meeting of the Dental Association in Edinburgh. The Association had within itself all that was necessary to make this a certainty, though the pleasure of the meeting could not fail to be enhanced by the fact of its being held in a town famed both for its literary and scientific societies, and for its poetical and historical reminiscences. With Edinburgh were associated the names of Goodsir, Blake, Nasmyth, and several others, whose researches into the structure and mode of development of the dental tissues had rendered most important services to that branch of anatomy which formed the special study of the members of the Association.

Directing the attention of the Association to the advantages to be derived from the collection and investigation of some of the many unsolved problems still to be met with in the department of dental surgery, he remarked that the cause of decay of the teeth had been carefully studied by many, and the futility of individual research was well exemplified by the result that almost every inquirer had founded a new theory for himself, each of which was identified with the idea preconceived before he ever commenced to study the subject. It was, then, most desirable that subjects of this kind, which it was important should be set at rest for the benefit of sound curative treatment, should be investigated by two or more minds in concert. He advocated the appointment of small committees for this purpose. Such a committee working together would, by the division of labour, be able more thoroughly to investigate what had already beeh done, so as to avoid the republication of observations and opinions which had long since been disproved and been forgotten ; and having thus placed themselves fairly abreast of the most reliable information, past and present, would reserve their energies for really original investigations. Amongst the subjects which might be taken in hand with advantage, besides dental caries, with the best means of preserving and utilising the roots of teeth after the loss of their crowns by disease or accident ; the extraction and replantation of teeth as a means of treating some forms of disease and restoring the teeth to usefulness. Various pathological conditions of the mouth also required enlarged inquiry and more extended investigation. A carefully considered report of a series of cases would be of far greater value than the scattered records of remarkable examples, which could only demonstrate the possibilities of abnormal conditions, and did little to advance the present state of our knowledge.

Concluding with some remarks on the present state of Dental education, Mr. Bate specially deprecated the existing inequalities in the standard required by the different examining bodies for the dental diploma. All feeling of rivalry in this respect should, he thought, be reduced to a minimum. He thought the various examining boards should come to some arrangement with the view of making the standard as uniform as possible, thus doing away with a frequent source of jealousy, and greatly strengthening the *esprit de corps* of the profession.

The President-elect, Dr. John Smith, LL.D., President of the Royal College of Surgeons, Edinburgh, then took the chair, and delivered his Inaugural Address. He said—Gentlemen, on taking the chair at this large, important, and influential gathering, I need not express the sense I feel of the high honour conferred upon me by my election as President of the British Dental Association. In acknowledging the compliment thus paid me, I have to assure you that I shall do all that in me lies to discharge the duties and maintain the dignity of this distinguished office; and, so far as my abilities permit, endeavour to uphold the honourable and eminent position which the Association has already attained under my able and illustrious predecessors in this chair. The opening address by a newly-elected President at meetings such as these not unfrequently partakes of a repetitionary character—a sameness of construction and identity of topic with those of past years—a ringing of changes on bygone addresses, necessarily engendered by the similarity of circumstances in which the successive speakers have, from time to time, been placed. Keeping this in view, and knowing that the time at our disposal in the present instance requires to be carefully economised, I shall not detain you by any lengthened reiteration of what has been so often and so admirably dwelt upon before. The objects, the achievements, and the prospects of the Association are known to every one now present. I do not, therefore, propose offering any remarks upon the past, nor have I anything original to suggest in reference to the future. To enter upon the past would savour more of a valedictory than an inaugural address; it is for the retiring President to 'cast a long and lingering look behind.' For myself, in the meantime, 'the world is all before me where to choose.' Without, then, presenting to you any prolonged eulogium upon the beneficial purposes of the British Dental Association, upon the amount of good work it has accomplished, upon the great advantages it has conferred, and the important aims and ends it has in view, towards advancing and promoting the interests of the professional body it represents, I have simply, and on all these points, only to offer you the words of unqualified congratulation that such an Association exists and flourishes. We are here to-day as the representative and supervising assembly, and, to a certain extent, as the administrative convocation for the Dental profession throughout Great Britain; and, being so, I have no hesitation in saying that our influence in such a capacity is felt throughout the world. It may be argued that we already have a Dental Act enunciating the laws regarding Dental practice; that long before its existence we possessed at least one great Dental school, and one great surgical corporation conferring on the students of that school a high and much sought-after distinctive Dental qualification; that at the present day we have many additional complete and reliable schools of Dentistry, and a full and recognised Dental qualification conferred in each of the three divisions of the kingdom; that over all these we have a court of supervision, provided in the General Medical Council, and a safeguard and guarantee against illegal practice and pretenders in the Dental Register; and that, in the face of such a state of matters, little seems left for an Association of this kind to do. The answer, however, is, that by the various schemes referred to—the means and appliances—the machinery for education, examination, and qualification has been provided; but it requires some effective power to render such machinery available, and to ensure the work it is intended to perform being done, and that such work shall be done thoroughly; and, besides this, that an opportunity shall be afforded for the collective voice of the profession being heard on all the different questions it may hold to be important, that the interest and privileges of its members shall be effectively maintained, and that the laws provided for such purposes shall be enforced and carried out in their integrity. These appear to be the functions and administrative duties of an Association of this nature; and without some such representative vicarious authority as it constitutes, mere legal enactments are liable to become unexercised and of no avail.

While, however, this Association has these important duties to undertake and to persue for the profession, it has also a duty to perform to itself. It has to keep in mind the onerous responsibility for which it is liable officially to be held answerable in case of its actions being a failure—incurring unpalatable expenditure—or exceeding its functions or its powers. In cases of transgression, hardship, misdemeanour, what seems the proper course of action may in the abstract appear a simple matter to be put in force. But when this comes to a practical application in an exact and rigorous form, care requires to be exercised that no despotic overriding of collateral and unexpected difficulties be attempted, rashly or indiscreetly, until these are met; as it need not be said that any proceedings taken by the Association or its representative board are much more likely to be successful by waiting till the line before it be pronounced all clear and safe, than by rushing on at express speed with some danger signal flaring in its face. Precipitate impulsive measures have nothing to recommend them. A prudent exercise of caution and determination will no doubt by-and-bye make the Association 'a terror to evil-doers and a praise and protection to those that do well.' But while one of the main objects of the Association is to act for and to exercise a certain amount of jurisdiction over the profession—purposes which, when judiciously handled by means of its executive, namely, the Representative Board, become a valuable and powerful element of control—the British Dental Association, unlike other purely governmental bodies, has reserved to itself the privilege of establishing and maintaining the means of promoting friendly feeling as well as scientific intercourse among its members. It has done so by the establishment of a Benovelent Fund, by its great statutory and ever-acceptable periodic gatherings in different and distant centres of professional life throughout the country, and by the publication of a journal devoted to the literature of dentistry, and ever open to the communications of its practitioners. In these ways it not only acts as a powerful means of furthering the interests of the profession as a community, but serves to foster and facilitate the acquirements, the abilities, and the recording of the experience of every individual member composing it, according to the energy with which he may avail himself of the great and numerous advantages placed by it at his disposal.

It is, then, this great and beneficial association which I have now most cordially to welcome on the occasion of its meeting here in Scotland's capital—the city of Edinburgh. You are here as men persuing and promoting the interests of science, faithfully forwarding the speciality to which your lives have been devoted. But I have to congratulate you, particularly the Southern strangers to our city, that such laudable pursuits have this year served a double purpose, and brought you to the 'stately Edinburgh thronged on crags.' I need not remind you of the romantic history, the features of picturesque attractiveness and natural grandeur, the monuments of antiquarian interest, the footmarks of a former age of splendour and renown, possessed by the city you are now honouring with your presence. It is to no mimic scene to which you are now introduced; no mere panoramic exhibition in which you now will walk. The actual scenes of old romantic legends and old associations will surround your steps on every side. A chequered history, broken as the memory of dreams, hangs over every shrine to which you may do homage. From the castle's rugged battlements and hoary towers, where kings were born and nobles pined and died, away down to deserted Holyrood, linked with the fate of Mary, fair but hapless Queen of Scots, and Prince Charles Edward, names as enduring as the time worn 'Crags' and Lion Hill, keeping their weird watch and ward high over all, there is scarce a quaint or tottering edifice but has its own most wild or woeful history.

Having referred to the customary excursions being perhaps less necessary from Edinburgh than from any other city, Dr. Smith concluded:—A long array of great historic names, now low in the dust, once peopled the wynds and closes of that picturesque stretch of lofty habitations from where

The castle holds its state,
And all the steep slope down,
Whose ridgy back heaves to the sky,
Piled deep and massive, close and high,
Mine own romantic town.

These, I say, will, all in their own subordinate capacity and in the event of time permitting, lend an additional interest to your meeting here, and while such relics of a bygone time suggest their own reflections, there is no want of more modern attractions in the legal, educational, ecclesiastical, medical and charitable monuments of interest throughout the city to while away a leisure hour, and of which our law courts, our University, and our immense Infirmary may help to serve as types. And now, gentlemen, offering you these remarks, I shall not detain you longer, nor further interpose between you and the more interesting business which lies before this meeting of the British Dental Association in Edinburgh.

Mr. Reid, L.D.S. Edin., read a paper on "The Application of Dental Science in the Detection of Crime." Medical jurisprudence occupied a wide field in the detection of crime in its varied forms, but in that part of it which might be termed dento-chirurgical jurisprudence it was narrowed down to the point of identification. While in several instances medico-legal evidence had been at fault, and a verdict of mistaken identity followed a lengthened and carefully-conducted trial, he had failed in finding on record an instance where the proof of identity brought out by the aid of Dental science had been set at naught.

Mr. Henry Sewill, M.R.C.S., L.D.S.Eng., read a paper on "The Prevention of Caries." He said that caries was impossible without acid, and without vitiation of the secretions of the mouth. Without due exercise in mastication teeth could not easily be kept clean, and where the function was impeded by the presence of tender teeth, these should be brought into a healthy state or extracted. Crowding of the teeth greatly prevented the constant beneficial rubbing and polishing of them, prevented the ready access of the alkaline saliva to those surfaces where acid-forming substances find their location. He was afraid they could not hope that for the sake of the teeth of posterity men would be advised to pick out big-jawed wives, but they could at least seriously impress hygienists with the fact that the human jaw needed adequate use for its due development, and that no dietary could be perfect which was composed of uniformly bland and soft substances, calling for little or no mastication.

Mr. W. Campbell, L.D.S.Eng., Dundee, read the next paper on "Fractures of the Inferior Maxilla," illustrated by diagrams shown by the oxy-hydrogen light, and gave a successful demonstration of a new splint which he had devised and used in some cases in the Dundee Infirmary in treating fractures of the lower jaw.

Mr. G. W. Watson, L.D.S.Edin., read a paper on "Antral Abscess." He enumerated the common causes, and the treatment he adopted, which was removal of diseased tooth and roots, washing out antrum with warm water, and afterwards with weak solution of permanganate of potash.

Dr. T. Stack thought the great majority of fluid diseases of the antrum arose from diseased teeth, and that though syringing with tepid water was good, usually some medicinal agent should be added to it.

Dr. Walker, M.R.C.S., L.D.S.Eng., read a paper on "Educational Centres." It was a notable fact that the population of Germany was more highly educated than that of the British Isles. Was this fact always to remain a standing blot in the history of our country? If not, what means could be adopted to make it otherwise? The British Dental Association might be one of the means to correct this general stagnation by considering the character of the primary and general education of their sons, and the result of public education in contradistinction of private.

Mr. J. R. Brownlie, L.D.S. Glas., read the last paper, on the "Prevention of Irregularity." He said that while a regular arrangement of the teeth as a result of nature's handiwork was common enough, Dentists were frequently called on to see the results brought about by certain other forces acting at variance with those named, giving to the teeth a crowded arrangement which was a blemish in the mouth of beauty, and which was an important factor in the production of dental caries. The age at which prevention could be carried out was a very early one, a much earlier age than Dentists usually had the opportunity of applying their knowledge. One ot the earliest habits a child acquired giving rise to deformity was that of sucking the thumb. Closely allied to this was the improper use of the feeding bottle. Next there was the possibility of the teeth of the first set becoming a cause of irregularity to those of the second. He also took occasion to refer to the practice of people setting no money value upon the services rendered and time occupied in consultations. An operation, he said, in itself so simple that the very veriest clown could hardly blunder, was credited with a money value, and the fee readily paid, while the special knowledge which had to be acquired by years of study, and which alone enabled one to deal intelligently with the conditions of the mouth, was set at naught too frequently as a thing not worthy of any recognition. Indefensible throughout, the practice was one which was essentially objectionable in regard to the case of children's mouths. If a dentist knew beforehand that on his decision would rest the question of fee or no fee, it was too much to expect from human nature that his decision would be free from bias, and founded purely on the merits of the case. The temptation was too great. If it were a question of the extraction of a temporary tooth, the operator should more than likely do what was wanted done by the parent, who was quite incapable of forming any adequate opinion of its ultimate effect upon the mouth. Was it possible that under such conditions the opinion could be founded purely on the merits of the case? The position could not be defended, and there were but few of those parents or friends who interested themselves in the subject who were not capable of recognising the risk to which the best interests of the child were exposed, and with whom a word or two of explanation was all that was needed to secure to the operator unreservedly an opportunity to act or abstain from action *secundum artem*.

Mr. Balkwill urged that the teeth determined the position and form of the alveolus, and advocated the retention of the temporary canine as long as possible. He desired statistics of effects of premature removal of temporary teeth, and related a case in which the second deciduous molar was extracted and he did not anticipate evil results.

Dr. Williamson remarked that thumb-sucking affected only the front part of the alveolar arch, and also mentioned lip-sucking as an item not mentioned by Mr. Brownlie. He alluded to an instance of the latter habit in which considerable hypertrophy of the lip ensued, and which eventually had to be removed.

Mr. Watson directed attention to two cases in the Museum of the Odonto-Chirurgical Society, in each of which the deformity was caused by thumb-sucking.

Mr. Campbell mentioned two cases in which an upper and a lower bicuspid were retarded in a boy and a girl, æt. 13. By pressure upon the gum over the absent teeth they very shortly afterwards appeared.

Dr. Stack urged the retention of the temporary teeth, especially of the lower canine. He also remarked that if Dentists put down their foot firmly, and said there shall be no consultations gratis, then, and not till then, would the practice complained of be given up.

Dr. Cunningham said that the public must be taught to know that it was for time and skill and medical advice, and not for a mere mechanical operation, that Dentists were paid their fees.

A meeting of the subscribers to the Benevolent Fund was also held; and in the evening the members dined at the Waterloo Hotel, the Lord Provost being among the guests.

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## BOOK REVIEW.

Vulcanite and Celluloid for Dental Purposes, by S. Eldred Gilbert, D.D.S., Philadelphia: The S. S. White Dental Manufacturing Co.

I suppose the necessity of more modern teaching in the mechanical portions of our specialty being perceived by the author of the above work, was the cause which gave birth to this book on the two most popular plastic bases in use.

The title "Vulcanite and Celluloid" does not express quite all the subject matter contained therein, as the author deals with several other processes, as taking models of the mouth, bites, &c. Any one requiring the best ways of working the vulcanite base or celluloid, or desiring a minute, concise and carefully compiled description of the method in use for taking plaster casts of the mouth, will do well to read this work, although opinions as to the superiority claimed for celluloid are, I believe, divided, at least, in England.

Although the author claims that plaster gives a normal cast of the mouth, he proceeds later on to supply instructions how to make the model abnormal by scraping, &c., in order to render it (the model) suitable to fit his denture to (p. 56).

This is a cruel irony on his premier material for modelling the mouth, and one, I believe, to be fatal to the recommendation he urges as to its use.

I could have wished, knowing, as I think I do, somewhat the needs of students, that he had confined himself to the working of the plastic bases, for as he leaves them (excepting, of course, plaster casts for the mouth) he leads us, or would lead those for whom he has written the book, further and further from the truth. As an example, I shall quote his mode of securing in gutta percha models of the mouth.

"Gutta percha is softened in hot water and placed in the impression cup; then inserted into the mouth, and gently crowded into position, the cheeks and lips being pressed against it while so held, thus causing the softened material to take the form of the mouth. This is allowed to remain until hard enough to retain its form, and then removed and placed in cold water, after which, plaster is poured into the impression and forms the cast."

I have never found gutta percha become sufficiently hard in the mouth to retain its form *during removal.* Perhaps I have never waited long enough—five or six minutes I consider enough for the patient.

Next comes wax. "This is manipulated similarly to gutta percha." I cannot warn students too earnestly against such an absurd statement.

Either of the two foregoing materials will take perfect impressions of the mouth, but to preserve their beautiful perfection, they should be for ever left in the mouth, as the slightest attempt to remove them must alter their form. Wax never hardens sufficiently at the temperature of the mouth. Gutta percha does so so slowly as to render it useless for the purpose.

The author places modelling composition in the second position to plaster; yet his instructions for its use, if followed, will not realise its best qualities.

When the work is read by the student, I should recommend abstention from practising the methods there given of working the three modelling materials. No work that I have seen excels this in the description of treating vulcanite and celluloid, and obtaining plaster impressions. For these alone it is worth having.

W. R. HUMBY.

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## FERMENTATION IN THE HUMAN MOUTH.

### THE FUNGI OF DENTAL CARIES; THEIR PURE CULTIVATION AND EFFECT UPON LOWER ANIMALS.

By DR. W. D. MILLER, BERLIN.

*(Concluded from page 349.)*

IN the May number of the *Independent Practitioner* and June number of *Dental Record*, will be found the description and illustrations of two species of micro-organisms which I had, up to the first of March, 1884, obtained from carious dentine. These species I isolated by inoculating culture liquids with very small pieces of carious dentine, taken from near the border of the normal tissue. If the fungus was not at once obtained in the pure state, a second culture tube was inoculated after the method of fractional culture, with a minimum portion of the first, and so on.

It soon, however, became apparent that the capture of these two species by no means ended the work; on the other hand, new forms continually presented themselves, and in order to be able to determine definite characteristics for each species, resort was had to the culture on plates of gelatine prepared with beef extract, calf's broth, malt decoction, etc.

The beef-extract gelatine, for example, I prepare as follows:—200 c. c. water + 3,0 beef extract + 3,0 sugar, are first neutralized, then slowly boiled for five minutes, and filtered (filter and all other vessels, of course, sterilized). After cooling, 8,0 of the finest gelatine is added and gradually heated till the gelatine is dissolved; it is then cleared with the white of an egg, and all together kept at the boiling point for about five minutes, stirring constantly to prevent burning; it is then passed through a filter, surrounded by a bath of boiling water, into glass tubes with cotton stoppers (both sterilized), and kept in a refrigerator. When to be used it is melted in warm water and poured upon sterilized cold glass plates, which may be m. 0,15 long by m. 0,07 wide, and placed in the moist chamber. The layer of gelatine should be about two m.m. thick.

Suppose now we have a culture containing different species of fungi, and we wish to separate them. A thin platinum wire with one end melted into a glass rod is sterilized in the flame of a bunsen burner, and on cooling dipped into the impure culture and lightly drawn across the surface of the gelatine; the fungi which adhered to the platinum wire are thereby scattered in a row upon the surface of the gelatine, and in a short time we will find that at certain points in the row one form of fungus has developed, and at other points other forms. Now, if we take upon the end of our platinum wire a small quantity of fungi from one of these points and draw it across the surface of a second plate, we will, in parts of this line, invariably obtain a pure culture of one of the species in the original impure culture, nearly every species being distinguished by some characteristic in the form which it takes in growing, and in its action upon the gelatine. Having obtained a pure culture in this manner, test-tubes containing gelatine are inoculated with it. In these it may be kept in a pure state for weeks, or months, while the plates are always short-lived.

The gelatine method of pure culture has one great disadvantage in the low melting point of the gelatine. Twenty-four to twenty-five degrees Centigrade is the highest temperature to which they can be exposed without danger of melting, and this, to fungi which are accustomed to a temperature of thirty-seven degrees Centigrade, is not always a matter of indifference. I have succeeded in isolating three species, besides the ones described in the May number of the *Independent Practitioner* (see also page 257 *Dental Record*), and, for the purpose of distinguishing them only, I will designate them by the letters *g*, *d* and *e*. When the species *a*, *g* and *d* are isolated, it is not difficult to tell one from the other; when, however, they are mixed together, it is next to impossible to determine which is which, and especially is this the case with *a* and *g*. Their modes of development on gelatine are, however, so different, that we possess therein a ready means of distinguishing between them. The *a* fungus, *sparingly* inoculated into gelatine tubes, presents in a few days the appearance which I have attempted to represent in Fig. 1*a*. It may be compared to a bunch of grapes, which presents all gradations from the fully developed berry to the little green one; the masses of fungi are globular or ovoid, exceedingly fine, and semitransparent, presenting altogether a strikingly beautiful culture, which it is impossible to even approximately represent by drawing. It furthermore forms a button upon the surface of the gelatine; the latter becomes softened but not liquefied. On the plates it presents soft, milky ridges or knots, raised sometimes a m.m. above the surface of the gelatine, and obtaining a width at the base of three to six m.m. The *g* fungus differs from all other fungi that I have yet found in decaying dentine, in that it completely liquefies the gelatine. The culture tubes present, therefore, a funnel-shaped area of liquefied gelatine, while the fungi themselves fall to the bottom of the funnel.

This fungus forms furrows in the plates, and if the plate is turned on its edge the whole mass of fungus flows from one end of the furrow towards the other, or slides quite off the plate.

The *d* fungus forms completely *opaque* masses which may have a slight yellowish tinge, provided the gelatine itself is yellowish.

It has a small surface growth, and liquefies the gelatine only to a slight extent. In cultures on plates which are two or three days old, the row of fungus appears to lie in a trough, or depression in the gelatine. It does not move, however, when the plate is turned on edge.

For the fungus of Fig. 4 I have not yet been able to establish definite peculiarities of growth. As far as my observations have at present extended, it differs from that of Fig. 3, in that it is almost entirely wanting in surface growth, and forms colorless masses, even in colored media. It does not liquefy the gelatine. Viewed by transmitted light it appears to have a bluish tinge, and a slight opalescence. It grows, however, very slowly, and I have consequently as yet been unable to establish certain and definite characteristics for it. The fungus described grows more slowly at gelatine temperature, and I cannot at present give any microscopical features by which cultures on gelatine may be distinguished.

The most important feature connected with all these fungi, especially the coccus forms, is that they possess a ferment activity; in other words, they are capable of producing acid out of sugar, or, in the human mouth, out of starch, by the aid of the diastatic action of the saliva. They may consequently all be looked upon as factors in the decay of the teeth. I would not venture to say that the *a* fungus is more concerned in the process of caries than all the rest together; nevertheless, such is the constancy with which I have found it, that if any one else should make the assertion I would have no reason for contradicting him. Cultivated in liquid substrata, none of them form films or skins upon the surface of the liquid, but powdery or fleecy precipitates upon the bottom and sides of the vessel. None, so far as I have observed, produce an evolution of carbonic acid in solutions containing sugar, nor do they appear to suffer when the access of oxygen is restricted.

A question of great importance, not only for Dentists but for general physicians, and, in fact, for everybody, is that relating to the possible pathogenic nature of these fungi. We find in the works of Leyden and Jaffé, Haussmann, Bollinger, James Israel, &c., sufficient ground for the statement that "these fungi, in all parts of the human body which they reach, can play the same malignant role as upon the teeth." Gangrene of the lungs, abscesses of the mouth and throat, chronic pyæmia, &c., &c., have by various authors been ascribed to the action of the fungi of the human mouth. Raynaud, Lannelongue and Pasteur produced what they called *maladie nouvelle* by inoculating rabbits with the saliva of a child bitten by a mad dog. And A. Fraenkel has in a number of cases produced sputum-septicæmia by inoculating rabbits with his own saliva.

We ask ourselves then the question: may not many of our obscure cases of infectious disease which now and then appear after extraction, or other Dental operations, and which are, without further examination, attributed to the unclean instruments or hands of the Dentist, be the result of an infection produced by micro-organisms in the patient's own mouth? If a man's saliva contains organisms which, when brought into the blood of a rabbit, occasion death in twenty-four hours, would it be a matter of no consequence to produce so large a wound in his mouth as that caused by the extraction of a tooth? For the purpose, if possible of throwing some light upon this question, I have undertaken a series of experiments for determining whether the organisms which are most commonly found in the human mouth, possess the power of producing death (by septicæmia or otherwise) by inoculation. These experiments, as well as the others recorded in this article, I have in fact only begun. My absence from home, however, prevents my carrying them on during the summer months, and I have determined, therefore, to present the results which I have already obtained, few and imperfect as they are.

The inoculations have thus far been performed on three rabbits, one rat, and six white mice. They were made partly with a mixture of the two fungi *a* and *g*, and partly with saliva which had been kept in sterilized calf's broth for fifteen hours, at blood temperature.

Each rabbit received 1 c. c. of the infected liquid, injected directly into the lung or abdominal cavity; the rat 0,2 c. c., and the mice 0,1 c. c.

*Exp.* 1. Small rabbit inoculated with 1 c. c. in the abdominal cavity.

In the course of a few hours the rabbit appeared evidently ill; refused to eat, and remained quiet in the corner of the cage. In twenty-four hours diarrhœa appeared, with a slight elevation of temperature. These symptoms increased during the next day, till fifty hours after the time of inoculation it was found at the point of death. The examination showed the blood to be almost entirely free from organisms, and no indication of septicæmia. Living fungi were found, however, in the abdominal cavity, and a large part of the right lobe of the liver was completely riddled with masses of fungi; also in the fæces were found enormous numbers, which, morphologically, were identical with those in the liver, their entrance into the alimentary canal from the liver being easily accomplished. I unfortunately neglected, however, to establish their identity by the proper cultures.

*Exp.* 2. Rabbit inoculated as in Exp. 1.

The animal manifested a slight indisposition on the second day, from which it soon recovered.

*Exp.* 3. Rabbit inoculated in the right lung with saliva which had been kept in sterilized calf's broth for fifteen hours, at thirty-seven degrees Centigrade. No effect apparent.

*Exp.* 4. White rat, injection in abdominal cavity.

The animal remained well.

*Exps.* 5-11. Seven white mice; five inoculated in abdominal cavity with *a* and *g* fungi; two in the lungs with saliva in calf's broth. Of the former two died at about the fortieth hour under the same symptoms as in Exp. 1. Great numbers of fungi were found in the abdominal cavity, which by culture on gelatine proved to be the *g* fungus. A number of colonies were likewise found in the liver. Microtome sections of the liver of the rabbit stained in Fuchsine show, when examined under the microscope with sufficient light to drown the tissue, a distribution of the fungi very similar to that often seen in the outermost layers of carious dentine. Of course, no definite conclusion can be drawn from a few experiments. They are, however, sufficient to show that these fungi certainly do possess a pathogenic character, and when brought into other parts of the human body may be able, under predisposing conditions, to produce disastrous results. Especially the continually swallowing of these fungi in great numbers may, by their ferment activity alone in the course of time, produce very serious derangements of the stomach and alimentary canal, since the small percentage of hydrochloric acid in the stomach, even in the presence of the normal quantity of pepsin, is not sufficient to devitalize them. It was with a certain degree of satisfaction that I have failed thus far to find the coccus of sputum-septicæmia in my own saliva. It is, however, very desirable that experiments should be made with the saliva of many persons, for the purpose, if possible, of determining in what proportion of cases this fungus is present.

Messrs. Underwood and Milles have endeavoured to repeat some of my earliest experiments in the production of artificial caries, but under those very abnormal conditions against which I entered warning in the *Independent Practitioner*, page 229, and the *Dental Record*, page 259. Failure was the necessary result. They performed, further, a very elaborate experiment, lasting six months, in which the baths became so putrid and offensive that "they quit the experiment with relief." They naturally produced no caries, thereby furnishing an admirable confirmation of the fact to which I have so often called attention, that it is impossible to produce even a trace of caries by putrefaction alone. They tried a third experiment, putting the fungi under such abnormal conditions that they could not produce acid, and of course failed again, once more confirming the fact that I have long since established, that we can have no caries without acid. With these experiments they risk the statement that artifical caries is probably an impossibility. The production of artifical caries is a *fait accompli*, and to deny its possibility is only to endanger the reputation of him who denies.

They state further that they can find no softened dentine which does not contain micro-organisms. This, however, is contrary to the experience of a great many American microscopists, and, moreover, as I have elsewhere stated, I shall take with me to the next meeting of the American Dental Society of Europe several hundreds of specimens of carious dentine, and be ready to show the areas of softened, non-infectine dentine, on any one or on all of them.

Messrs. Underwood and Milles understand me, in the third place, as being of the opinion that all the micro-organisms connected with caries of the teeth are only different forms of one fungus. The readers of the *Independent Practitioner* (and the *Dental Record*) know better. I have stated simply that *one* of the many fungi found in the human mouth in connection with caries of the teeth, may produce different forms of development. This is the fungus which I have designated by the prefix *b*. It is scarcely necessary to add that I am always prepared to prove its existence microscopically, as well as on the authority of many of the best micrologists of Germany.

No one, I think, will deny that within the last few years I have done a large amount of work, and contributed some evidence towards the solution of the problem of dental caries. The amount of material dealt with, and the ground gone over, have been so extensive that it has been absolutely impossible, with the greatest efforts, to remain as long by each step as would have been desirable. It may be, therefore, that at some points the subject has not been presented with sufficient clearness or decisiveness; it may be, too, that at some points the conclusions have been faulty, since I make no pretension to infallibility. Time will show whether this is the case. At present I know of no important change which I could make, if I were to re-write all my contributions of the last three years.

I desire to give, in closing, a very short *resumé* of the work which I have accomplished.

1. I convinced myself by the examination of some thousands of slides of carious dentine, that micro-organisms were always present, and that they, without any doubt, were the cause of various anatomical changes which were found to take place in the structure of the dentine during caries. (Here, of course, the question of priority does not suggest itself; Leber and Rottenstein, as is well known, were the first to give definite expression to this fact.)

2. I proved, at the same time, that the invasion of the micro-organisms was not, in the majority of cases, simultaneous with the softening of the dentine, but that large areas of softened dentine could be found that contained no fungi. Of all those who examined my preparations in America, no one, whatever his theory, ever once denied this fact. I concluded from this that the softening of the dentine went in advance of the invasion of the organisms.

3. I determined by analyses of masses of carious dentine, sufficiently large to give reliable results, that the softening of the dentine is of the nature of a true decalcification. That the decalcification of the outer layers is almost complete, and diminishes in degree as we advance towards the normal dentine. Furthermore, that the same relations maintain in dentine softened in a mixture of saliva and bread, or in weak organic acids; also, that in a mass of carious dentine the lime-salts had been removed to a much greater extent than the organic matter.

4. I maintained from the first that the softening of the dentine was produced by acids, for the most part generated in the mouth by fermentation. I had, however, no direct proof of this.

5. I *proved* that fungi exist in great numbers in the human saliva and in carious dentine, which have the power to produce acid under conditions which are constantly present in the human mouth. I determined this acid, for one of the fungi, at least, to be the ordinary ferment, lactic acid.

6. I produced caries artificially, which under the microscope cannot be distinguished from natural caries, by subjecting sound dentine to the action of these fungi in fermentable solutions.

7. I determined the influence of various antiseptics and filling materials upon the fungi of caries.

8. I isolated various forms of these fungi, and determined *in part* the conditions most favorable to their development, their characteristic reaction upon gelatine, their physiological action, their effect when inoculated into the system of lower animals, and their possible connection with certain obscure diseases generally attributed to the carelessness of the dentist.

My continual search has been after facts, and such facts as I have obtained I have presented before the profession, never putting before them either theory or speculation, nor anything which was not the result of severe and continued labor, and in this spirit I propose to prosecute this work, as well as any other that I may undertake in the interest of the profession.—*Independent Practitioner.*

NOTE.—Since writing the above, I have succeeded in producing death by septicæmia of both mice and rabbits, by injecting into the lung saliva from the mouth of a perfectly healthy person.

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# IMPACTION OF ARTIFICIAL TEETH IN PHARYNX.

## ABSCESS AND PYÆMIA ENSUING;

### WITH REMARKS ON THE IMPACTION OF FOREIGN BODIES IN THE PHARYNX AND ŒSOPHAGUS, AND ON THEIR PASSAGE THROUGH THE STOMACH AND INTESTINES.

BY W. S. CHURCH, M.D.

*(From St. Bartholomew's Hospital Reports, Vol. XIX.)*

THE very general use of false teeth, whilst doing much to relieve the discomfort and preserve the health and appearance of the wearers, has added another risk to the many by which, even in our present high state of civilisation, human life is surrounded. The risk of death consequent on wearing false teeth is certainly not a very serious one, but it is perhaps less considered than it should be by those whom age or accident has compelled to supplement nature by art.

As a proof that this risk is a reality, and that death sometimes ensues so rapidly that there is no opportunity for surgical interference, I will mention the two following cases, in which death occurred without a suspicion of the real cause, until it was revealed at the *post-mortem* examination :—

*Mr. Pollock's Case, published in the Lancet, April 3rd*, 1869.—A young man was brought in dead to St. George's Hospital on August 16th, 1862. He was stated to have been running, when he stumbled and fell to the ground. As he did not rise, he was supposed to be in a fit, and was conveyed to the hospital.

At the *post-mortem* examination, when the finger was passed into the pharynx in order to take out the adjoining structures, an irregular hard mass was felt lying upon the epiglottis. This proved to be two false teeth. There can be no doubt that in this case the plate became dislodged, and fixed by its sharp points in the pharynx, and pressing on the glottis, produced immediate suffocation.

Another instance I take from *The Times* of June 1st, 1882 :—"Yesterday afternoon Mr. W. H. Carrington held an inquest at the Council Chamber, Portsmouth, on the body of Mr. John Forbes Calland, who had been residing at Southsea for eighteen months, who was drowned from a bathing machine on Southsea beach on the previous day. Captain Calland, 3rd Battalion Welsh Regiment, stated that his father, the deceased, was seventy-two years of age. On the previous day he bathed off Southsea beach, and was found shortly after lying on his face in the water. On his body being examined, it was found that his false teeth had been displaced and had blocked his windpipe, accelerating his death, which was caused by drowning." It appears to me that the false teeth were the cause of the drowning. They were probably drawn into the larynx by the deep inspiration caused by entering the cold water, and so gave rise to choking ; water entering the mouth and lungs afterwards.

Mr. Cock's prophecy in 1858—"As, however, the use and application of artificial teeth is daily on the increase, and is now universally adopted in all ranks and conditions ; as, moreover, many of these succedanea are badly made, imperfectly fitted, and carelessly worn, there can be but little doubt that the casualty [swallowing them] which induced me to perform a severe and perhaps dangerous operation will occur again and again" *—has been amply fulfilled, and many cases of the swallowing of false teeth, of their passage through the stomach and intestines, of their impaction in the pharynx or œsophagus, and subsequent removal, have been recorded. In 1877 Mr. Weiss read a paper before the Odontological Society, entitled " A Summary of Cases where Artificial Teeth have been Swallowed, or have become Impacted in the Pharynx," and since that date numerous instances of this accident have been published in the medical journals.

I am not aware, however, that any case has yet been published similar to that about to be related, although it seems to me probable that the sequence of events in a case reported from the coroner's court at Liverpool † in the year 1877 was similar to those met with in the present instance :—

" An inquest was held by the Liverpool coroner on Saturday on the body of a middle-aged woman named Maria Shuker, a domestic servant at Wrexham. About a month ago she went to the Liverpool Infirmary, having swallowed a set of false teeth in her sleep. Owing to the plate breaking, the teeth had lodged in her throat, and were removed by an operation ; but an abscess having formed, she died on Friday last. The jury returned a verdict accordingly."

In the following case, the impaction in the gullet of a set of false teeth *for a very short time* led to fatal results, although, as will be seen from Dr. Garlick's letter, no difficulty was experienced in extracting them.

Margaret C., a young woman, aged 21, was admitted into Elizabeth's Ward on April 3, 1882, shortly before my visit to the ward. She was obviously very ill—so ill and exhausted that one did not like questioning her at any length, and it was with difficulty that we obtained some account of her illness from her.

She stated that she had been ill some time, and had had a large and painful swelling in her throat, which had disappeared; she did not at first state anything about the accident, but before the end of my examination she told me that her teeth had stuck in her throat.

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* *Guy's Hospital Reports*, 3rd series, vol. iv., p. 117.

† *Daily News*, March 19th, 1877, quoted from Mr. W.'s paper.

She was suffering from dyspnœa, and had pain in the chest. An examination of her chest showed that she had some pleurisy and congestion of the lungs. There was considerable diarrhœa. In front of the throat, at the level of the cricoid cartilage, the skin was wrinkled and the tissues felt boggy, but there was no œdema or actual swelling present.

Her temperature was 103°, her pulse rapid, and general appearance and condition left little doubt in my mind that she had pyæmia. She passed a bad night, the bowels remaining very relaxed; respirations laboured. She died in the course of the next day.

*Notes of the Post-mortem Examination of the Body by Dr. Ormerod.*

Body well nourished, swelling and discolouration of the front of the neck.

Abdominal viscera normal.

Ecchymosis on the anterior part of the left pleura. No fluid in the pleural cavities, but recent dirty-looking lymph sticking to the visceral pleuræ at bases. Lungs much congested at both bases; there were also small patches of consolidation, breaking down at their centres.

In the neck was a large abscess filled with sanious matter, situated beneath the deep fascia, and reaching downwards as far as the insertion of the first costal cartilage with the sternum on the right side. The bone and cartilage were both eroded. The abscess extended backwards behind the trachea. After removing the pharynx and trachea, and opening the former, a small hole was seen about a quarter of an inch in diameter, on the surface of which was a small blood clot. The hole was situated an inch to the left of the middle line of the back of the pharynx, about the level of the arytænoid cartilages.

I subsequently obtained the following particulars, partly from her sister and partly from Dr. Garlick. The plate to which the teeth were attached was a vulcanite one, and had been worn for some time, and had become worn or broken along its posterior edge. The accident happened on the night of the 22nd of March.

When the teeth were extracted they were covered with blood; she did not complain of her throat until the evening of the 23rd, when she first said it was sore and hurt her to swallow. On the

24th or 25th (the sister was not quite sure which day) she had shivering, and seemed very ill on the 26th, and went the following day to consult a doctor. The throat became very painful and greatly enlarged, and she had much difficulty in swallowing. She was too ill to go to see a doctor, and after some days was seen by Mr. Gould, and advised to apply at the hospital. In reply to my inquiries, Dr. Garlick has been kind enough to send me the following particulars :—

"Some weeks ago I was called up at night to remove some false teeth from the gullet of Margaret C. The account given me was that she had awoke in the night, found something in her throat, and in the half-waking state pushed it down with her finger.

"To the best of my recollection, this happened about three hours before I was called ; she was then retching violently from emetics that had been given by the friends. The teeth could be reached with the tip of the fore-finger, and were removed without difficulty beyond that experienced in grasping them with the forceps; there was no bleeding of consequence after. I saw nothing of her after, and concluded she was well, as the friends never called on me again."

I am also indebted to Dr. Garlick for a description of the plate and teeth attached; for the poor girl, before coming to the hospital, got up one evening and threw the plate into the fire. Dr. Garlick thus describes the plate :—

"It was a palate plate of vulcanite, bearing about three front teeth; the plate had been broken along its posterior edge, causing it to fit badly, and hence the accident. The plate, or rather the remainder of it, was of square shape, and something over an inch in measure along the side. I remember also from one part a blunt-pointed piece of metal, the size and shape of a common pin, projected about the sixth of an inch. The plate might have been larger than the estimate given, but was probably under 1½ inch in linear measurement. The broken edge was straight, and did not increase the danger of it as an impacted body. The thickness of the plate was about one-tenth of an inch."

The sequence of events is here clear enough. A broken and ill-fitting plate becomes dislodged during sleep and falls back into the pharynx, causing the girl to awaken with a feeling of suffocation. She pushes it whilst half-awake and half-asleep lower down the throat, and the plate becomes impacted just about the level of the larynx. Emetics are administered by the friends, and the violent retching very probably caused the blunt-pointed piece of metal at the end of the plate to lacerate the wall of the œsophagus, as when removed by Dr. Garlick the plate was covered with blood. The injury done to the œsophagus led to the formation of an abscess in the neighbouring parts, and this was followed by pyæmia and death.

A very similar case occurred at the hospital this year, and I am indebted to Mr. Savory for permission to publish the notes taken by the registrar, Mr. Macready.

John R., aged 26, was admitted to the hospital under Mr. Savory's care on May 14.

At 6 A.M. on the previous day, May 13, he swallowed during sleep a plate with two artifical teeth attached to it. He vomited soon afterwards and has been sick occasionally since.

Three hours after the impaction of the teeth his neck began to swell. He now complains of pain about the episternal notch and above it. There is no dyspnœa when he is quiet. He cannot swallow, as the attempt gives him much pain. He brings up much frothy mucus, but no blood. It pains him greatly to try to talk.

There is much fulness of the front and sides of the throat, due to emphysema.

When placed under chloroform, Mr. Savory was not able to feel the teeth with his finger, but on passing a horse-hair probang, he felt the plate midway between the larynx and sternum. The probang was passed beyond the obstruction and then withdrawn several times; at length the plate was dislodged upwards, and came within reach of the finger, when it was removed with long forceps.

May 15.—Has been very restless during the night. He did not explain why he was so uncomfortable. Tossed about and groaned frequently, hawking and spitting frothy mucus. He had three subcutaneous injections of $\frac{1}{6}$ gr. of morphia, and subsequently a draught of bromide of potassium and chloral, after which he slept for three hours.

The neck appears rather more swollen and is still emphysematous. Breathing rapid. He is constantly tossing about in the bed and groaning. His face is flushed. A linseed-meal poultice was applied to the neck. He told his wife that the agony in his chest was more than he could describe. Later on in the day he had orthopnœa.

May 16.—Is very much flushed. No improvement. Did not sleep during the night, is still constantly turning and tossing about in bed. Respirations 48. At 1.30 P.M. he became worse. Remained conscious almost to the time of his death at 2.50 P.M.

His temperature was high—

| | | |
|---|---|---|
| May 14, | - - | Morning, 101°. |
| ,, | - - | Evening, 102·4°. |
| ,, 15, | - - | Morning, 103·4°. |
| ,, | - - | Evening, 104°, and later 105°. |
| ,, 16, | - - | Morning, 102·6°. |
| | | Just before death, 102·6°. |

*Post-mortem Examination.* — Much emphysema of the cellular tissues of the neck. The emphysema was traced into the chest, and filled both the anterior and posterior mediastina.

The œsophagus presented an ulcerated perforation on the posterior wall opposite the cricoid cartilage, and a corresponding ulcer was found on the back of the cricoid cartilage itself, to the left of the middle line, just below the arytænoideus muscle. This last ulcer perforated the mucous membrane and submucous tissue, but did not penetrate the interior of the air-tube. It was evident from these ulcers that the plate had been arrested at the end of the pharynx, and had taken up a position nearly in the antero-posterior plane, with one edge resting against the cricoid cartilage and the other against the wall of the pharynx.

The pharynx was perforated, and a suppurating track could be traced from the opening down the left side of the œsophagus to the chest. It descended along the spine some distance below the root of the left lung. The left pleura contained a large amount of pus, which compressed the lung to some extent against the spine. The lungs were somewhat congested, their pleural surfaces much inflamed. No perforation of the pleura was detected. Emphysema was found on the right side, and to a less extent on the left.

I am unable to state what attempts had been made to remove the plate before the patient was admitted to the hospital. He came from Wales, and had, whilst suffering much pain and distress from the impaction of the plate of the teeth, been exposed to a long and tedious night journey.

It would be very interesting to know what were the difficulties which prevented the plate being removed at once, as it is clear that, when first impacted, it was within easy reach of the mouth, and the plate itself was a small one, and did not present any unusually sharp points. The teeth attached to it were two in number, representing the right lateral incisor, and the first bicuspid of that side.

Before the patient's admission to the hospital the plate had been dislodged from the pharynx and become impacted lower down; and it appears that when admitted he was suffering from the effects of the inflammation and ulceration at the original seat of impaction, rather than from the presence of the plate in the œsophagus.

It is mentioned in the notes that he vomited soon after the impaction of the teeth. One would like to know if he had taken an emetic. The early occurrence of emphysema and the amount of ulceration of the pharynx, which was too great to have resulted from mere pressure in so short a time, are evidence that the walls of the pharynx were torn, either by attempts at removal or by the muscular action which took place during the efforts to vomit.

The case of Margaret C., page 444, shows that death might have resulted in this case also, even if the teeth had been removed at once; and this, like hers, illustrates the great danger of mediastinal suppuration and purulent infiltration which appears especially to belong to abscesses in connection and communication with the œsophagus.

The fatal termination of this unfortunate accident in Margaret C. led me to consider the subject of the impaction of foreign bodies in the pharynx and œsophagus; and I may, without trespassing on the surgical portion of the subject, discuss the steps to be taken in these cases, and draw attention to the eccentricities, if I may use such a term, of Nature in dealing with foreign bodies which have been either accidentally or intentionally swallowed.

When a foreign body is swallowed, it may become impacted in the pharynx and œsophagus, or pass on to the stomach. How it happens that sometimes foreign bodies of the most unlikely kind, such as pins, needles, pointed and irregularly shaped bodies, like artificial plates with teeth attached, pass on at once to the stomach, whilst at other times rounded objects, such as coins, remain impacted, cannot be explained.

Most of the instances of coins retained in the gullet are met with in children, and we may conclude that in them the œsophagus has not attained a sufficient size to allow coins to pass down it.

After having reached the stomach, a foreign body may either remain there indefinitely, or may be rejected by vomiting, or may pass onwards into the bowels, or, as in some few instances, it may perforate the wall of the stomach and make its way outwards with suppuration of the surrounding parts.

By far the larger number of foreign bodies that pass the pylorus traverse the rest of the intestinal canal without much difficulty, and are passed per anum. Sharp and elongated bodies are naturally more dangerous during their passage than rounded ones ; hence most of the recorded cases of foreign bodies making their way through the bowels and being removed from abscesses in the abdominal walls are instances of needles, knife-blades and other pointed articles.

In attempting to withdraw foreign bodies impacted in the pharynx or œsophagus through the mouth, the amount of force which it is justifiable to use in the attempt must be left to the judgment of each individual operator ; in like manner the combination of traction with other means, such as rotation, or depression of one portion and elevation of another, of the impacted body, depends on the nature and position of the body itself. The same may be said of special instruments which have been made use of in these cases, though in most instances removal has been effected by forceps.

When it is found impossible to withdraw the foreign body through the mouth, what is to be done ? Should attempts be made to push the impacted body into the stomach, or should œsophagotomy be undertaken at once ?

There are several instances recorded* in which artificial plates with teeth attached were with ease pushed onwards to the stomach, and subsequently passed from the bowels, although it had been found impossible to withdraw them. When we add to these the more numerous instances in which foreign bodies have either passed unaided into the stomach or have been pushed onwards by a probang, and subsequently satisfactorily got rid of either by vomiting or by completing their journey through the bowels, it appears to me that no very great risk is run by adopting this course, provided that care be taken to use very little force in the attempts at propulsion.

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* Mr. H. Smith's Case, *Lancet*, April 1, 1871. Mr. David David's Case, *Lancet*. April 8, 1882.

It is obvious that in the case of large bodies whose shape is irregular, or whose surfaces are armed with sharp and projecting points or hooks, the risk of injury to the œsophagus and the improbability of their eventual evacuation *per vias naturales* would be greatly increased.

I have been unable to find any recorded cases of fatal hæmorrhage or death following attempts at pushing impacted teeth or other foreign bodies onwards to the stomach, but I fear that such accidents have frequently happened. Mr. Henry Smith * states that he has known two instances of death occurring in this way; and Dr. King at the Medical Society of London, January 16, 1871, also mentioned a case in which fatal hæmorrhage had occurred in the hands of so able a surgeon as Mr. Syme, who, being unable to pull up a set of false teeth, pushed them down. From these instances, which are only incidentally, as it were, recorded, I fear we may conclude that many more similar accidents have happened, unsuccessful and fatal cases not being published as freely as successful ones.

When all attempts at extraction of the foreign body through the mouth, or of dislodging it by downward pressure have failed, pharyngotomy or œsophagotomy still remain for the surgeon to have recourse to. Before considering the advisability of this operation, it will, I think, be of use to review very briefly the results arising from the impaction of foreign bodies in the pharynx or œsophagus, and for this purpose I shall give brief abstracts of some of the cases recorded in different journals and periodicals, most of which have not hitherto been brought together.

*(To be continued.)*

## ROYAL COLLEGE OF SURGEONS IN IRELAND.

### PROFESSIONAL DENTAL EDUCATION REQUIRED BY THE ROYAL COLLEGE OF SURGEONS IN IRELAND.

EVERY candidate for the Licence in Dentistry of the College shall produce evidence of having been registered by the General

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* *Lancet*, April 1, 1871.

Medical Council as a student in medicine. Certificates of study will not be recognised by the College if the date of commencement of the course to which the certificate refers is more than fifteen days prior to such registration.

Every candidate for the Licence in Dentistry shall be required to pass a Preliminary Examination and three Professional Examinations.

### Preliminary Examination.

The regulations of the College which refer to the Preliminary Examination of the candidate for the Letters Testimonial (which see) shall apply to the candidate for the Dental Licence.

### Professional Examinations.

The First and Second Professional Examinations shall be held in July and October of each year.

Should the student fail to pass in July, he may present himself in October.

The Examination of each year must be passed before a new session can be entered on, but, in special cases, it shall be in the discretion of the College to permit the student, for what appears to them sufficient cause, to commence a new year of study, and subsequently present himself for a supplemental Examination.

### First Professional Examination.

The candidate is required, before admission to the First Professional Examination, to produce evidence of having been registered as a medical student by the General Medical Council, also to produce certificates of having subsequently attended—

Surgical department of a General Hospital, nine months.

| | |
|---|---|
| Winter Courses | Practical Anatomy, with Demonstrations and Dissections.<br>Physiology.<br>Surgery.<br>Chemistry. |
| Summer Courses | Practical Chemistry.<br>Practical Physiology.<br>Materia Medica. |

The fee for this examination shall be £5 5*s*. Candidates who are rejected will be admitted to re-examination on paying an additional fee of £2 2*s*.

The subjects and order of this examination are identical with those of the Second Professional Examination for the Letters Testimonial of the College.

### SECOND PROFESSIONAL EXAMINATION.

The candidate is required, before admission to the Second Professional Examination, to produce evidence of having passed the First Professional Examination, also certificates of having subsequently attended—

Surgical department of a General Hospital, nine months.

| | |
|---|---|
| Winter Courses | Demonstrations and Dissections.<br>Practical Anatomy.<br>Surgery.<br>Medicine. |

The fee for this examination shall be £5 5*s*., and for re-examination, if rejected, £2 2*s*.

The subjects and order of this examination shall be identical with those of the Third Professional Examination for the Letters Testimonial of the College.

### THIRD AND FINAL PROFESSIONAL EXAMINATION.

The Third Professional Examination shall be held in April, July, and October. The candidate is required, before admission to the Final Examination, to produce evidence—

*a.* Of having passed the Second Professional Examination. Or of having passed a diploma in Surgery recognised by the College.

*b.* Of having attended, subsequent to registration by the General Medical Council, the following courses of Lectures recognised by the College:—

| | |
|---|---|
| Dental Surgery and Pathology<br>Dental Mechanics | of each Two Courses. |
| Dental Anatomy and Physiology<br>Dental Metallurgy | One Course. |

*c.* Of having attended for two years the practice of a Dental Hospital recognised by the College.

*d.* Of having been engaged in acquiring a practical knowledge of Mechanical Dentistry, for at least two years, in a public Laboratory recognised by the College; or for at least three years under the instruction of a Registered Dentist. The candidate shall also submit a piece of mechanical work certified to be of his own making.

The candidate holding a diploma in Surgery recognised by the College shall be required to produce certificates of one course of each of the above special Dental subjects, and of half the Hospital attendance and half the Laboratory work required from other Dental students.

As this remission has been made on the understanding that the Qualified Surgeon shall devote his whole time to the Dental work, the special Dental courses, Hospital attendances, and Laboratory work required from him, must all be taken out after the date of his diploma in Surgery.

### FEES.

The fee for the Final Examination shall be, in the case of Licentiates in Surgery of the College, and for Dental students, £7 7*s*. For re-examination, if rejected, £4 4*s*.

For candidates holding a Surgical diploma other than that of the Royal College of Surgeons in Ireland, £12 12*s*. For re-examination, if rejected, £6 6*s*.

### SUBJECTS OF EXAMINATION.

Candidates shall be examined in—

1. Dental Surgery—Theoretical, Clinical, and Operative.
2. Dental Mechanics—Theoretical and Operative.
3. Dental Anatomy and Physiology.
4. Metallurgy and Physics.

### ORDER OF EXAMINATION.

#### FIRST DAY (Printed Questions).

Two hours shall be allotted to this examination. Three questions each in Dental Surgery, Dental Mechanics, Dental Anatomy, Metallurgy, and Physics shall be given. One question at least must be answered on each subject.

Candidates who have already passed in Physics at the Preliminary or Equivalent Examination shall be exempt from this subject at the Final Examination.

#### SECOND DAY (Oral).

Each candidate shall be separately examined on each of the subjects of the first day.

### Third and Fourth Days.

(Operative Dental Surgery and Mechanical Dentistry.)

On these days the candidate's knowledge of Clinical Dental Surgery and Practical Operative Dentistry, and of Clinical Dental Mechanics and Practical Mechanical work, shall be tested. Candidates shall be examined at Hospital, and in the Dental Laboratory, and shall be required to perform operations on the model, and to carry out such mechanical work as the examiners shall direct.

### Rejected Candidates.

No candidate for second or subsequent examination shall be admitted thereto who has not satisfied his examiners at previous examinations; but all candidates who have passed any examination shall get credit for the same when presenting themselves upon a subsequent occasion.

### Examinations "Sine Curriculo."

Candidates who were in practice before 1878, whose names are on the Dental Register, and who are unable to furnish the certificate required by the foregoing regulations, may be admitted to examination if they shall fill in the schedule of application as follows:—

1. The name, age, and address.

2. A certificate of his moral and professional character, signed by two Registered Medical Practitioners and by two Registered Dentists.

3. The date of his commencing practice, and whether such practice has been carried on in conjunction with any other business, and if so, with what business?

4. Any certificate he may have of general education, or degree in Arts or Medicine.

5. The particulars of professional education.

The schedule of application, containing these particulars, shall be sent to the Registrar of the College, at least three weeks before the date of the examination; and the Council of the College shall then determine whether or not the candidate shall be admitted to examination for the Dental diploma. Such examination shall comprise the same subjects, and be conducted in the same manner as is herein set forth in reference to the Second and the Final Professional Examinations.

### FEES.

The fee for this examination shall be £21; re-examination, if rejected, £10 10*s*.

### DECLARATION TO BE TAKEN BY LICENTIATES.

The candidates entitled to receive the Dental diploma are required to attend upon such day as shall be notified to them, and to take a declaration.

They shall then sign the College roll, and shall receive their diplomas.

An enrolment fee of £1 1*s*. is payable to the Registrar of the College on the issue of the diploma.

Candidates who have been admitted by curriculum to the Licence in Dentistry can, by an additional year's study, obtain all the certificates required for the Letters Testimonial of the Royal College of Surgeons.

These bye-laws shall come into effect from and after 1st day of August, 1884. But the Council of the College reserve the right of making such modifications, as may seem to them reasonable, in favour of students who shall have commenced their studies before that date.

## AMERICAN DENTAL SOCIETY OF EUROPE.

THE Annual Meeting of the AMERICAN DENTAL SOCIETY OF EUROPE was held at Vevey, Switzerland, August 26th, 27th, and 28th, 1884, Dr. W. D. Miller, Berlin, President, in the chair.

The Secretary (Dr. Foerster, of Berlin) read a paper entitled, "On Clinical Anti-Septic Treatment," by Dr. Wright, of America, an honorary member of the Society.

Dr. Du Bonchet (Paris) said he should like to enquire what experience the Society had in the use of copper amalgam, or copper as alluded to in the paper; as he had the impression that the dentine was rendered hard by its presence.

Dr. Bödecker (New York) mentioned that at one of the late meetings of the New York Odontological Society, Dr. Dwinelle stated that in removing an old copper amalgam filling he found the blackened dentine exceedingly hard.

Dr. Elliott (London) remarked that as the subject of amalgam will come up subsequently in the meeting, he having a paper to read on it, it might be as well, with the President's permission, to postpone discussing the subject until that time.

The President said: We have the pleasure, gentlemen, of having a well-known investigator from the other side with us to-day, and as he has some decided views with regard to Rigg's Disease, so called, I would call upon him to give us his views.

Dr. Bödecker then said: Well, I am glad to meet with the American Dental Society of Europe, but I do not know that I have anything to say that is new or of value. My views have been fully detailed in the *Cosmos* reports of the Odontological Society of New York, but they have not always been correctly reported. I will give a short sketch of my views and experiences. The disease called Rigg's Disease, or more properly Pyorrhœa Alveolaris, consists of pus flowing from the sockets of the teeth, such pockets often being the result of tartar or a lack of thorough cleansing on the part of the patient. The disease is found at all ages, but more frequently late in life. I have, however, seen it in a person of eight years of age, the teeth being elongated, one or two nearly quarter of an inch. The most common cause, particularly late in life, is tartar. Systemic causes are by no means absent, certain temperaments being more liable than others. Hereditary transmission may also be a factor of some moment in the case. As time will not permit me to go into the question of causes fully, I will confine my remarks to the disease as we ordinarily see it, when caused by tartar or a lack of care or cleanliness.

First—Remove all the pieces of tartar that are fairly accessible without wounding the gum much. Some good operators, like Dr. Abbott, claim that they meet with the most success when following strictly the lines marked out by Rigg, but I think this an improper apprehension of the conditions found in this disease. If an operator were to remove all the tartar in the first stage of the disease, where there are loose gums, pockets and pus, it may be all that is necessary; but the probabilities are that these pockets become again filled with *débris*, &c., and the disease again makes progress. What should we do then? I would, as stated before, gently remove all foreign matter, wash out the pockets with a solution of corrosive sublimate, 1 part to 1,000 of water; then, if I suspect necrotic tissue under the gums, I use a saturated solution of sulphate of zinc, also saturated solution of iodide of potash with crystals of iodine added; apply with stiff nerve plugger with cotton, carrying it up under the gums. Necrotic tissue shows itself by a dark blue line along the margins of the gums. On the following day, if the colour is still present, renew the application; it generally disappears after two or three applications. Then I apply the tartrate of chinoline, which is an anti-septic and astringent, but not an irritant—1 to 45 of water I find to be about the right strength; and repeat the application until the gums look healthy. After an interval of several days again apply as before. The cure is generally complete in three or four weeks. I have had some very bad cases; the teeth are sometimes so loose that they can be removed readily by the finger. Extreme cases of this kind require great care, not only on the part of the Dentist, but also on that of the patient, for the teeth must be thoroughly cleaned after every meal. To assist in this, I prescribed some anti-septic wash. At each visit I remove more and more of the tartar; then support the loose teeth either by a silk ligature or, what is better, a fine gold wire. I think it was Dr. Clark, of New York, who recommended the use of a support of oxy-phosphate of zinc; this may be done, or a small plate made after taking an impression in plaster, the loose teeth having been tied together previously. It is important that this plate should not rest upon nor impinge upon the gums, as perfect cleanliness could not then exist. I give the patient a syringe and a solution of peroxide of hydrogen, directing that the pockets about the gums be well washed with the medicaments. Of course, we must not expect success in every case, but I find that where the treatment indicated is carried out, 70 per cent. of the cases will be cured.

Dr. Du Bonchet said he had sometimes used a small supporting plate in the cases spoken of by Dr. Bödecker, and with benefit, the plate resting on the gums.

Dr. Bödecker: Then you cannot have cleanliness, for tartar will gather under the plate and thus irritate the gums.

Dr. Du Bonchet: The object is partly to get the tartar deposited on the plate and thus save the gums.

Dr. Bödecker: It is much better not to have the plate touch the gums at all; the patient should come once in a while to have the plate removed and thoroughly cleaned.

Dr. De Trey: I have used these supports for loose teeth for about ten years. After thoroughly removing tartar I take a long piece of fine gold wire, pure gold, and commencing at one of the back teeth I weave it backwards and forwards, in and out where there was room, twisting it where it passes between the teeth around to the other side, thus firmly supporting all the teeth embraced, and yet not interfering with cleanliness.

Dr. Bödecker: That is about the way I do it.

Dr. Terry (Zurich): When you find the teeth elongated, can you reduce them?

Dr. Bödecker: Yes, if I can get any antagonism, otherwise I have no hope of their remaining in their proper position.

Dr. Sach (Breslau): That is my experience.

Dr. Gregory (Lyons): Do you remove all superfluous liquid when you are treating the gums?

Dr. Bödecker: Yes, with bibulous paper.

Dr. Williams (Geneva): Is dryness necessary?

Dr. Bödecker: Certainly.

Dr. Sach: When the disease is somewhat dependent upon malarticulation I have found it hopeless to medicate.

Dr. Bödecker: I do not give up any case when the pulp is alive.

Dr. Sachs: How do you know when the pulp is dead?

Dr. Bödecker: By the colour, stomatiscope, electric light, &c. You may let a molar remain even if one root is detached by the disease.

Dr. Sach: I had a case—the Countess of ——. She had formerly been under Dr. Miller's care; her teeth were elongated, with inflamed gums, bad breath, &c. We can relieve the case, but the disease recurs.

Dr. Chamberlain (Rome) asked Dr. De Trey how long he would use gold ligatures on loose teeth?

Dr. De Trey: If the case is bad I keep the string on always. My father-in-law is an example. I fastened his teeth that way three times. Once one tooth came off, I cut a groove around it and tied it in with the others, and he has kept in his teeth for ten years, thus doing without artificial teeth.

Dr. Du Bonchet: This subject is a most interesting one; we must learn from each other. I have used instruments and adopted the radical treatment, but only with partial success. I syringe out the pocket with oxygenated water, using a probe-pointed syringe to push away the gums in advance of the liquid. I then apply iodide of zinc, very little, as I found in one case extensive inflammation resulting from too liberal a use; then weak solution of carbolic acid (5 per cent.); direct the patient to use a soft brush, and to return every day. We must persevere in such cases; the disease will return if we do not persevere. I have had some bad cases, one in particular—a lower canine. Pus came from two or three teeth. I could not get at the pocket, it was so high up. You may remember that at the meeting of the Society, held two years ago at Ostende, I exhibited an electric cautery; this apparatus I have found most useful. In this case I cauterized the gum from the free margin right up to the pocket. It is astonishing how quickly the wound heals up. I would ask if Dr. Bödecker has any experience with this instrument?

Dr. Bödecker: No. I omitted to mention that in some cases there is partial necrosis of alveolus; do what you like in the ordinary way and you meet with no success. I then use a Rigg's scaler, go deeply down and remove the offending part; only in these isolated cases have I found heroic treatment necessary.

Dr. Edwards: I have used the chloride of zinc in this disease, alternating with aromatic sulphuric acid, but in the ligation of loose teeth experience has been unfortunate, as it is quite as likely to pull out the tooth as not; fine gold wire might be better.

Dr. Edwards: The acute cases are easily treated, but not so with the chronic. With the acute form I use boracic acid and a weak solution of chloride of zinc. I would like to ask Dr. Du Bonchet whether he still continues to think well of sulphate copper?

Dr. Du Bonchet: I do not use it as much as formerly.

Dr. Edwards: I prefer wood as a medium to make the application to the gums; wood with a bit of cotton wrapped around it.

Dr. Bödecker: I have also found boro-glycerole useful, but do not advise too large a pharmacopœa. If we give the gums the gums the necessary conditions of recovery, they will do so. A wound on the hand will not heal if it is flooded with saliva and other secretions; so when you give Nature a chance with the gums, she will do her duty.

Dr. Edwards: I have found the tincture of sumach a good astringent in the after treatment.

The meeting then adjourned.

During the afternoon there was a large attendance at the clinics. Dr. De Trey removed the cement filling from a molar where the pulp had been resected by his process some eight months before; apparently the pulp was in a healthy condition. Upon another case the operation of resection was performed, although the patient gave evidence that it was not a painless process. A case was exhibited (a patient of Dr. Weitgel) showing extensive restoration in gold of many of the teeth; also a case of bridge work. In this case gold fillings were put into the cavities on either side; into the anterior one, one end of the bar containing the interposed tooth was let; a platinum hollow screw or cylinder was built into the filling in the molar; a screw passed vertically through the other end of the bar (here flattened) and was screwed into the cylinder in the molar, thus making a strong, cleanly and easily removed bridge.

Dr. De Trey exhibited a case of much interest; the gentleman had broken off a R. U. central, a tooth formerly partially girdled by gold. The pulp was dead, and the root gave trouble for a long time; finally it was discovered that the tip of the root had also been broken by the blow; it making its appearance at the free margin of the gum. The main fracture was nearly transverse at the neck and was treated by a pin in the natural crown fastened by cement, and crown, pin and all, put in place upon the root. As the labial filling had become detached by the manipulation, an impression was taken in ox. phos.; into the impression a gold filling was placed in the exact position of the cavity of the original filling. The impression was then broken, and the gold filling put into its place in the mouth. When examined by the members it appeared exactly as the original must have done, and served to strengthen the tooth.

Dr. Edwards exhibited a new matrix. It was of steel, shaped like a sickle, forming a double wedge, so that when placed between the teeth, by the gum, it was pushed up or down, as the case required, thus forming a sort of universal matrix.

Dr. Elliott exhibited a new mallet; the handle, cylinder, &c., were made of a new alloy—bismuth bronze—of silver colour. The part held in the hand was mottled celluloid, while between this part and the hammer head the metal was flattened to make a spring; the cylinder was filled with lead, but at one end a thick cushion of leather had been inserted—motive; great weight to overcome the loss by the softness of the leather. The mallet was much pleasanter to the patient than the older form. He also exhibited some new double ended aluminium bronze plastic instruments, the points not being oxidizable; also a new syringe made of the hypo. pistonless syringe, adapted to a handle.

### WEDNESDAY.

The meeting was called to order, Dr. Edwards (Vice-President) in the chair.

Dr. Miller said: Some Americans who do not investigate for themselves take some authority on micro-organisms, as Pasteur, Tyndall, &c., no matter how old it may be, and base their theoretical views upon this. To study the subject, one must take the more recent German investigators, as Koch, and study for oneself by means of patient cultivation of the organism and by much microscopic observation. One must be sufficiently familiar with the organisms to detect them at sight. I will not go into the subject, as my views have been already sufficiently ventilated, but I would mention, briefly, that the question has arisen as to whether the action of the organism is primary or secondary, it being pretty well proved that dental caries commences in decalcification produced by acid; but whether these organisms secreted the acids, or merely followed where they had preceded, was the question. Let me illustrate. Suppose we have a cavity in a molar, as in sketch. The carious portion is removed by spoon excavators, sliced in the freezing microtone, stained in fushine, cleared by essential oil, and mounted in balsam. These specimens show that the organisms travel only in the radial line with the pulp, or, in other words, in the tubules; that in the corners where the external ends of the tubules are not exposed there we have no organisms, but we do have decalcification, the action of the acid travelling in all directions, while the micro-organisms only follow the line indicated. Undoubtedly the fungi have the power of converting any saccharine matter into lactic acid. Now, if our statements are correct, we should be able to produce artificial caries, and this we can do. I have with me, and will show, at the demonstration to follow, any number of slides where the pathological conditions are identical.

Dr. Du Bonchet: What do you consider the best anti-septic?

Dr. Miller: I would refer to my papers in the *Independent Practitioner* (and *Dental Record*), one of which gives a list of substances tested for their powers in this respect. However, Hydrargyrum bichloridum is, doubtless, the most potent; but, as it is a powerful poison, it must be used diluted—say 1 per cent,—but it would seem that Iodoform fills the requirements as well as it is possible.

Dr. Gregory: Does the decalcified portion you have mentioned, in which there are no micro-organisms, become recalcified?

Dr. Miller: No doubt.

Dr. Terry: Would it not be safe practice to excavate the decalcified part and fill with cement?

Dr. Gregory: But the recalcification is certainly better than any artificial substitute.

Dr. Miller: Of course, if in excavating you cut off the tubules from the pulp, you can have no recalcification.

Dr. Bödecker: Recalcification can only occur near the pulp. There must of necessity exist a grade of low inflammation, the same as in all cartilaginous parts, and before recalcification can occur there must be a so-called retrograde metamorphosis—that is, there must be a breaking down of the more complex into the more simple elementary combination, and from the medullary condition advance. I have had very much pleasure in seeing Dr. Miller's beautiful specimens. I have not had the opportunity of making any original research myself in the etiology of dental caries; I shall not, therefore, criticise what has been said.

Dr. Terry: Has Dr. Miller always found the same fungi?

Dr. Miller: No; there are a large number of fungi of different kinds, and they do not like to live together. The particular kind found in human caries can exist without oxygen, and are not instrumental in producing putrefaction.

Dr. Terry: All the varied forms of decay have a cause in organisms, have they not?

Dr. Miller: Yes.

Dr. Terry: Is there, then, one which might be considered normal?

Dr. Miller: That is a very difficult question. The fungi have a separate existence, and are not the result, but the cause, of decay. For example, if you keep beef in an anti-septic condition —that is, keep out the fungi—it will keep indefinitely.

Dr. Terry: All air, then, contains the organisms. Does the air found at different altitudes or in different places contain different amounts of the fungi? Is the air of the Engadine freer than that of Vevey?

Dr. Miller: Yes; undoubtedly the question of temperature, humidity, barometric pressure, &c., are important in determining the amount, but perhaps humidity is the most important. When moist the organisms stick to anything they may come in contact with, but when they become dry they are released and float in the air.

Dr. Terry: The French, in opposition to Dr. Koch's views, water the streets during the cholera epidemic. Are there organisms in the blood ?

Dr. Miller: It is difficult to say; in a state of perfect health they probably do not exist, but when any pathological condition is present they may. This is Dr. Koch's view.

Dr. Elliott then read his paper on "Amalgams."

Mr. President and Gentlemen,—Last year I had the pleasure of reading a paper before this society on the subject of amalgams. I then gave you in tabular form the results of numerous experiments carried on for a period of several months; but I was not satisfied as to their accuracy. My balance turning at a milligramme, was not sufficiently delicate, and insufficient time was taken for the experiments. You may remember that I then mentioned that the test I used for shrinkage was that known as the specific gravity test; that I watched the changes in the specimen under examination for three days. Thinking to make the experiments more valuable, I have gone over the whole field again, and for the specific gravity have used a balance, turning at $\frac{1}{10}$ of a milligramme. The observations for shrinkage were continued for a week with each kind of amalgam, and the results are given in the table, a part of which was published in the *Transactions of the Odontological Society of Great Britain.*

The column on the left is for hours, showing the number of hours since the last observation. The next three columns show the weight in water of the specimen (1 gramme) mixed dry, one medium and one moist; the dry was mixed with as little mercury as would serve to barely keep it together; the medium to the consistency ordinarily used in practice, while the moist was very much so. The weights are given in milligrammes, and shrinkage is shown by an increase in weight. The remarkable variations in weight, showing contraction and expansion, have been noticed in all the amalgams experimented on. The last line shows the result in shrinkage at the end of seven days.

## TABLE I.

### SULLIVANS.

| Time. | Dry. | Medium. | Soft |
|---|---|---|---|
| | 1681·5 | 1806.3 | 1810·5 |
| 12 hours | 1703 | 1811·5 | 1817·5 |
| 3 " | 1710 | 1814·3 | 1821·5 |
| 4 " | 1709·2 | 1815 | 1819·4 |
| 4 " | 1710·3 | 1812·2 | 1822·5 |
| 12.45 " | 1713·6 | 1813·5 | 1822·5 |
| 4.15 " | 1715 | 1815·5 | 1822·5 |
| 6.30 " | 1715 | 1812·5 | 1822·5 |
| 13.45 " | 1715·3 | 1811·5 | 1820·2 |
| 4 " | 1710·5 | 1811·5 | 1818 |
| 7.30 " | 1706·1 | 1808 | 1817·7 |
| 11.30 " | 1706·5 | 1808 | 1817·7 |
| 5 " | 1708·1 | 1808·3 | 1818·2 |
| 7.30 " | 1709·1 | 1808 | 1820 |
| 11.30 " | 1708·9 | 1809 | 1818·6 |
| 6 " | 1709 | 1811·9 | 1827·7 |
| 6 " | 1706·7 | 1809 | 1818·6 |
| 36 " | 1706·7 | 1808·4 | 1820·9 |
| 4.15 " | 1707·5 | 1809·3 | 1820·9 |
| 6·15 " | 1710 | 1807·5 | 1818·5 |
| 7 days. | – 29·5 | –1·2 | –8 |

The second table gives, first, a list of the amalgams experimented upon; secondly, their aggregate change, shrinkage, or expansion in the dry, medium, or wet form; the next three columns show the specific gravity; and the last three the breaking strain in lbs. as applied to discs 1 mgr. in thickness and 7·20 mgr. in diameter, also in the three forms, dry, medium and wet.

These discs were made in steel rings of the requisite thickness, allowed to harden twenty-four hours; then the amalgam was extracted from the ring by being placed in a cylinder with an orifice the size of the disc. A plunger exactly the size of the disc was forced through the cylinder, pushing the disc before it; by this means it was possible to remove the discs from the rings without injuring them.

After hardening for one month, these discs were tested in a micrometer and were shaved down to 1 mm., tested to the $\frac{1}{100}$ of a mm. They were then supported in the breaking apparatus, which consisted of a horizontal cylinder with a blunt conical plunger pressing in the centre of the disc, the force being measured by a

## TABLE II.

| AMALGAMS. | | SHRINKAGE –. EXPANSION +. | | | SPECIFIC GRAVITY. | | | BREAKING STRAIN (in lbs.). | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Dry. | Medium. | Soft. | Dry. | Medium. | Soft. | Dry. | Medium. | Soft. |
| Stewart's Sullivan's... ... ... | | – 30·9 | – 5·2 | – 13·5 | 9·873 | 12·062 | 10·342 | 2 | $2\frac{9}{10}$ | 2 |
| Sullivan's ... ... .. ... | | – 27·5 | – 1·2 | – 8 | 10·773 | 12·651 | 11·647 | 3 | $3\frac{7}{10}$ | 4 |
| Bonwill's ... ... ... ... | | – 24 | – 14·8 | – 10·5 | 8·695 | 9·202 | 10·101 | $9\frac{1}{5}$ | $10\frac{2}{5}$ | $6\frac{1}{2}$ |
| Hallam's ... ... ... ... | | – 21·1 | – 16·3 | – 7·5 | 8·620 | 9·785 | 9·288 | $17\frac{1}{11}$ | 10 | $3\frac{2}{5}$ |
| Gregory's ... ... ... ... | | – 5 | – 6·3 | – 13·9 | 10·127 | 9·478 | 10·476 | $15\frac{7}{10}$ | $10\frac{1}{5}$ | $12\frac{1}{10}$ |
| Lawrence's ... ... ... ... | | – 25·5 | – 6·9 | – 5 | 9·083 | 9·174 | 9·523 | $12\frac{1}{10}$ | $9\frac{1}{10}$ | $2\frac{9}{10}$ |
| Fletcher's Flagg's Standard ... | | – 2·6 | – 6·6 | – 2 | 9·69 | 9·174 | 9·433 | $15\frac{1}{2}$ | $5\frac{4}{5}$ | $2\frac{9}{10}$ |
| „ Extra Plastic ... ... | | + 27 | – 8.7 | – 5·4 | 9·934 | 10·51 | 9·615 | $8\frac{1}{10}$ | $5\frac{3}{10}$ | $5\frac{7}{10}$ |
| „ „ „ 2nd qual... | | – 18 | + 14 | – 7 | 9·352 | 9·95 | 10·359 | $6\frac{1}{5}$ | $1\frac{3}{5}$ | $1\frac{9}{10}$ |
| Ash's... ... ... ... ... | | – 10 | – 7 | – 1 | 10·115 | 9·975 | 13·439 | $11\frac{3}{5}$ | $9\frac{1}{5}$ | $10\frac{3}{5}$ |
| Davis's Gold... ... ... ... | | – 12 | – 5 | – 8·3 | 9·509 | 9·97 | 10·071 | $9\frac{9}{10}$ | $9\frac{7}{10}$ | $8\frac{1}{5}$ |
| „ Crystal Gold ... .. | | – 22·5 | – 8·5 | – 3·5 | 9·345 | 10 | 10·255 | 11 | 10 | $8\frac{4}{5}$ |
| Nickold's ... ... ... ... | | – 13·4 | – 3 | – 3 | 9·514 | 10·05 | 10·101 | $14\frac{1}{11}$ | $9\frac{4}{5}$ | $8\frac{3}{10}$ |
| Robertson's X L ... .. ... | | – 21 | – 4·4 | – 3 | 9·2165 | 9·756 | 10 | $13\frac{4}{5}$ | $13\frac{3}{5}$ | $11\frac{3}{5}$ |
| Fletcher's Pl. and G. ... ... | | – 23 | – 16 | – 5 | 9·0497 | 9·8522 | 10 | $15\frac{7}{10}$ | $14\frac{1}{5}$ | $15\frac{7}{10}$ |
| Robertson's Standard ... ... | | – 3 | – 1·6 | + 28·4 | 9·2165 | 9·756 | 10·0502 | $15\frac{1}{5}$ | $11\frac{3}{5}$ | 10 |
| Davis's No. 2 ... ... ... | | – 7·2 | – 4·5 | + 33 | 9·3023 | 9·9502 | 10·1522 | $12\frac{4}{5}$ | $12\frac{1}{5}$ | $11\frac{4}{5}$ |
| Dental Manufacturing No. 2 ... | | – 12·4 | – 3 | – 1·1 | 9·2165 | 9·9502 | 10·2565 | 12 | $11\frac{7}{10}$ | $10\frac{3}{10}$ |
| Fletcher's Flagg's Con. ... ... | | – 24 | – 6 | – 3 | 9·4366 | 10·204 | 10·4114 | $9\frac{4}{5}$ | 9 | 12 |
| Standard (Echfeldt and Dubois) ... | | – 27 | – 11 | – 2 | 9·2639 | 10·2565 | 10·7521 | $10\frac{3}{10}$ | 9 | $12\frac{7}{10}$ |
| Townsend's ... ... ... ... | | – 11 | – 5 | ... | 9·0497 | 9·756 | 10·1522 | $17\frac{1}{5}$ | 12 | 10 |
| Chicago ... ... ... ... | | ... | – 2·5 | – 5·5 | 8·5836 | 10 | 10·1011 | $11\frac{7}{10}$ | $9\frac{1}{5}$ | $10\frac{1}{5}$ |
| Arrington's ... ... ... ... | | + 22 | – 3 | + 5 | 7·7719 | 9·9009 | 10 | 11 | 10 | 9 |
| A Silver, 30 grms. ...<br>Tin, 20 grms. ... | Pure Mercury | – 44 | – 4 | – 2 | 8·4786 | 10·2564 | 10.0951 | 9 | 12 | $10\frac{3}{5}$ |
| B Silver (pure), 15,555 grms.<br>Tin, 11,703 grms. ... | | – 14 | – 1 | 0 | 8·4786 | 10·2564 | 10·0951 | 7 | $12\frac{3}{5}$ | $15\frac{1}{2}$ |
| C Coin Silver only ... | | – 33 | – 6 | – 7 | 9·8522 | 11·7047 | 11·7047 | $6\frac{1}{5}$ | $8\frac{3}{10}$ | $8\frac{1}{5}$ |
| D Coin Silver, 15 grms. ...<br>Tin, 3 grms. ... ... | | – 27·6 | – 25 | – 5 | ... | ... | ... | 8 | $8\frac{7}{10}$ | $8\frac{1}{5}$ |

self-registering balance. I recognise most fully that these experiments cannot be considered conclusive. A much larger number of discs should be made of each kind of amalgam, my opportunities only allowing me to make fifteen to eighteen of each.

Perhaps the most prominent benefit the profession can derive from these experiments is the knowledge that there is an individuality about each and every amalgam which makes it incumbent upon the manufacturers to ascertain positively under what conditions it will give the best results. The majority of practitioners, for some reason, use their amalgam dry; doubtless because, in working, it gives one the impression that the best results should occur with the least mercury, whereas the experiments go to show that many do better when either mixed medium or moist; some are decidedly better mixed wet. When experiment has proved that a certain proportion of mercury gives the best results, then each package should be so labelled by the makers. We have had enough of the untruthful statements of manufacturers, such as—"This amalgam does not shrink nor discolor in any mouth, &c."; "This amalgam should be used as dry as possible, &c." The last would be all right if it were followed by some qualifying statement, some facts for us to base our judgment upon.

Gentlemen, please to take my experiments *cum grano salis;* do not accept them as proving positively the property of any amalgam. Indeed, there cannot be that scientific accuracy that we so desire; at least, there is no prospect in our time, for this reason, it is practically impossible to get perfectly pure metals to experiment with, and as the amount of impurity must vary, so will the results. Then my investigations, substantiated by clinical observation, fail to show that even the fairly pure materials we may get give any better or more uniform results than the less expensive; nor do the results in these experiments show greater variation than is to be found in the published results of experiments with the alloys for mechanical purposes.

Dr. Bödecker: I think the thanks of the Society should be given to Dr. Elliott for these exhaustive experiments. At a recent meeting of the New York Odontological Society, Dr. J. J. Dodge read a paper on the tendency amalgams had to assume the spherical form. This tendency may account for some of the peculiar changes noticed by Dr. Elliott. Dr. Dodge's paper went to show that, owing to the soft state in which amalgam is used, there is a tendency for the mass to increase its horizontal diameter in the lower jaw at the expense of the vertical. You know, gentlemen, that we have more trouble with small cavities than with large? I may not be right about Dr. Dodge's views.

Dr. Miller: Dr. Herbst sent me some of his amalgam, a large number of specimens of which Dr. Bödecker has been good enough to bring to this meeting. You will notice that among those shown there are fillings made in the natural teeth, subsequently split open and tested with a magnifying glass; also copy of an engraved seal, &c. I have personally tested this amalgam in conjunction with others, but found that it did not show any superiority.

### Afternoon Session.

Dr. De Trey's paper, "Advice to Parents, &c.," was then read by Dr. Miller.

Dr. Du Bonchet: I have been in the habit of giving phosphate of lime to children to improve the character of their teeth. I would like to know the experience of others in this matter.

Dr. Sach: I have known parents to give lime water, and I have done so largely myself, with very excellent results.

Dr. Edwards: I have some little experience with the lacto-phosphate of lime. I ordered it for my wife early in gestation, for the benefit of the fœtus; but I must say the results are deplorable. The child, now eight years old, has wretched teeth.

Dr. Elliott: My third son was brought up on condensed milk, and at four years of age his daily consumption was a tin of 1 lb. At that time, fearing some contraction in the throat by the exclusive use of fluid food, and because his teeth were all decaying away, I determined to force him to take more solid food, an attempt we had often made before without success. In this case it took the child four hours to swallow a small piece of bread. In the course of a week he could take food in small quantities, and was put upon oatmeal diet; the decay in his teeth was at once arrested, and eleven years after he still had some of these temporary teeth. Something has been said of the injurious effects of sugar upon the teeth; it certainly neither accords with my experience nor observation. My family and myself are large consumers of sugar, and we all have remarkably good teeth.

Dr. Miller: Sugar, while in some conditions forms the basis of lactic acid, so injurious to the teeth, is not practically so bad as might be supposed, as, being fluid, it is more readily removed from the mouth by its fluids. Investigators have fairly settled the question whether phosphates, &c., should be given—the effects upon bone were the same whether more or less was given, only a definite quantity would be taken up; the rest was not assimilated.

Dr. Williams: Prof. Watt has written much on the subject, and through his influence, when associated with him in business, I gave my wife phosphates, the only result being that the teeth came in rather early. Between the teeth of this child and another without such treatment there was no apparent difference.

Dr. Miller: My wife, for constitutional reasons, could not take phosphates, but the child was well developed and the teeth perfect.

Dr. Terry: My wife, during our stay at San Remo, lived mostly on fish, and the teeth and health of the child were excellent. As regards sugar, I only think it injurious when taken to excess.

Dr. Gregory: Mastication is my great hobby. People do not masticate enough, and suffer in consequence. I also always insist upon children sleeping with their mouths shut.

Dr. De Trey: I have noticed how injurious grapes are to the teeth. Many people come here for the grape cure, and I always find the teeth badly injured, mainly through excessive use of the remedy.

Dr. Terry: My experience of the grape cure agrees with that of Dr. De Trey; the patients overdo it. I had a case at St. Moritz, in which the enamel could almost be removed by the finger, not from the grape cure, for none were used, but from the water (medicinal) of the place. I think that the erosion we see is often the result of the tooth brush.

Dr. Elliott: It is a mistake to suppose true erosion is ever caused by the tooth brush. You know my practice is mainly among English people, and if there is one feature I have noticed more than another, it is the lack of care on the part of the patient. The people, as a nation, do not keep their teeth as clean as they ought to do. A large part of my time is taken up in showing them the necessity of greater care, and giving them proper directions on the use of the tooth brush. Now, I am perfectly convinced from one physical fact, that erosion is not caused by the tooth brush; it has always, or nearly so, a sharp well-defined edge.

Now, I defy anyone to make a sharp edge with the brush; the edge would always be cut off—always rounded.

Dr. Terry: Dr. Elliott did not understand me. I only meant that injudicious use of the brush might injure the enamel; the brush should always be rotated from the gums.

Dr. Bödecker: As we are, in a few minutes, to have a clinic, and as I am to illustrate the Herbst method of operating, I will take this opportunity of explaining the process. A year ago I received a pamphlet from the Society of German Dentists at Frankfort describing a process of burnishing foils into cavities with the engine. I saw some samples of the work, and I was amazed. I took the opportunity, when in Bremen, of calling on Dr. Herbst, and spent several days with him. He gave me all the information possible, and I believe it is a process of value, particularly for approximal cavities. I think the gold used is too soft for either contour or crown cavities. Herbst had no experience in contouring, and asked my assistance. I prepared some cavities for him, and he filled them; and you will notice them among the specimens here. But, either the gold is too soft, or the instrument does not fully condense it, as you can readily see with a pin. In a competition trial, with Dr. Herbst, he filled a cavity by his process in one-third the time it took me to fill a similar one by the Bonwill mallet; but my plug weighed more. The cases that we find most difficult by other modes, as the distal surfaces of molars, are the easiest by the Herbst method; but in all cases this method requires a simple cavity; if an approximal one, it must be made simple by a matrix fixed solidly in position.

Dr. Chamberlain: Is the gold cohesive?

Dr. Bödecker: Yes, very cohesive.

The meeting then adjourned to Dr. De Trey's office, where Dr. Bödecker demonstrated on a patient the Herbst method in the distal cavity of a bicuspid.

Dr. Bödecker: We always use, in commencing, a large point and plenty of gold—two or three large cylinders. After they have been condensed, another layer is added, and so on. I do not feel sufficient confidence in myself in this new process to fill the crown, so I do that part of the operation as of old.

## Thursday Morning.

Dr. Rosenthal (Liege) presented, through the President, a new wide-mouthed bottle for holding gold foil; the peculiarity consisted in the glass stopper being hollow, and containing chloride of calcium, or quick lime, covered with kid, the object being to absorb all moisture.

The President then called upon Dr. Elliott to read his report on "Operative Dentistry."

Dr. Elliott: I can easily see how a paper of this kind could be made most interesting and instructive, and I think it would be a good idea if such a paper were produced every year. It should contain the gist of all the accessible professional literature of the day, both as to new books published and the magazines of all languages. To write a paper of this kind would require much time; and while this is my idea of what the report should be, in point of fact, I have not had the time to do more than run through the *Dental Cosmos* for the year.

Dr. Elliott then read some brief notes, criticising here and there, and asking for the views of those present on each subject; this led to an interesting discusssion, of which we have no report.

Dr. Elliott: I am sorry to stop so interesting a subject, but, in conclusion, I am anxious to mention some experiments I have made on the subject. Believing, as I do, from much observation and many experiments, that in cohesive gold the best and most useful work we can do will be found to be the most dense in character. I have had an iron matrix made composed of two pieces capable of being separated; the cavity was drilled out between those two parts, having a pit at the bottom to serve as a starting point. This cavity was filled in seven different ways; the plug was then removed, weighed, and the specific gravity taken, with the results as shown:—

| | | |
|---|---|---|
| Salmon Auto-plugger. | 1 Flat foil | 8 thicknesses of Kearsing's No. 4 cohesive, ⅛-in. wide, annealed in advance, 9 sheets. Time 2·10 hours. Specific gravity 18·588 + |
| | 2 Pellets | ¼ sheet rope cut in 8 pellets. 8¼ sheets. Time 2. 24. Specific gravity 18·485 + |
| | 3 Crystal Gold ... | Time 1.47. Specific gravity 17·327 + |
| | 4 Hand pressure... | Foil same as No. 2. Time 1.30. Spec. grav. 13·7307 |
| | 5 Bonwill Mallet... | " " 1·8 sheets. Time 1.8 Spec. grav. 15·172 |
| | 6 Herbst method... | " " " 1.55 " 11·560 + |
| | 7 Electric Mallet... | " " 1 " 1.30 " 15·747 |

You will see by this that in point of density the one made with the automatic and flat gold is the best, and in time, the operations stand in the following order:—Bonwill (electric *v.* hand pressure), Automatic Crystal Gold, Herbst, Automatic Flat gold, Automatic Pellets.

While in density they are as follows:—No. 1, 2, 3, 7, 5, 4, 6.

As you know, gentlemen, our first desire is to do good work. Secondly, we wish to do it with as little discomfort to the patient as possible. We know that hand pressure is the most agreeable, and also that hand work can be made as good as any; but it is slower, and much harder for the Dentist, an important consideration when his physical strength is tried to the utmost by the exactions of a large practice. We often cannot give the time that is necessary if we rely upon hand pressure (of course I allude only to cohesive gold), consequently we must use something that will strike faster to enable us to cover the whole surface as rapidly as possible. This is, perhaps, fairly met by the several mechanical mallets now in the market—as the Bonwill, the Power, and others, perhaps most fully by the Electric. Penetration does not necessarily mean efficiency. I hold in my hand a pad (2 by 3) composed of sheets of writing paper, on it are the foot prints of the several mallets experimented with. I took a pointed plugger and the mallet. I used in practice (lead, with a soft and a hard wooden face) and made a row of holes with each face, my assistant malleting with the same force as applied at the chair; then the automatic, with the same force used in introducing the experimental fillings; then hand pressure; then the electric. The comparative penetration is shown by the number of sheets pierced, and the force applied was measured by a registering balance. In penetration the order was as follows, with the pressure in lbs. in the next column.

| | | Penetration Sheets. | Pressure in lbs. |
|---|---|---|---|
| 3¾ oz. | Mallet, soft face wood... | 3 | 2 |
| | „ hard „ „ | 3 | 2 |
| 6 oz. | „ lead „ | 5 | 3 |
| | „ leather face | 4 | 2 |
| | Hand pressure, light | 11 | 8 |
| | „ „ heavy | 15 | 12 |
| | Electric | 4 | 2 |
| | Salmon Automatic Plugger | 8 | 6 |

It was a surprise to me to find that hand pressure gave the greatest penetration. My explanation is that the excellent work of the electric is not so much dependent upon the force of the blow as upon its evenness and rapidity. This is in a measure corroborated by the results from the most regular of all blows; the automatic, necessarily regular by its construction; of course we cannot forget at the same time that its weakness is in its slowness; evenness of condensation can only result from giving it care and time.

The President: As there is no time for discussion, I will call upon Dr. Elliott to read his paper on "Porcelain Crowns."

Dr. Elliott: Mr. President and Gentlemen, some five years ago I read a paper before this Society on the same subject, illustrated by some sixteen drawings, embracing all that I could find out on the subject at that date. Since then, Dr. Doxter, of New York, has published in the *Dental Cosmos* very much the same thing. Dr. Butner has also published a paper. I do not claim to bring before you anything particularly new, but to call your attention to the vast amount of ingenuity that has been developed in this department, and in that way prevent you from bringing before the profession, supposing them to be new, plans already tried and abandoned. To make the subject plain to you, and to enable us to get over a large amount of matter in a short time, I have made over sixty drawings, 2 by 3 feet in size, and coloured, so that you can see at a glance the peculiar feature. No attempt has been made to take them chronologically, the only arrangement being from the simple to the more complex.

Space will not allow us to take up the subject at all in detail, and the drawings being so numerous, could not be illustrated without much expense. The reading of the paper, or rather the necessary description and criticism attending the exhibition, lasted over an hour, and was listened to attentively by the Society.

Dr. Elliott: I have made some experiments which may prove

| Annealed. | Unannealed. | A PULL OF | |
|---|---|---|---|
| lbs. | lbs. | | |
| 4½ | 4½ | Bent to an angle of 45° | Platinum. |
| 4½ | 4½ | „ „ „ | Phosphor Bronze. |
| 4½ | 4½ | „ „ „ | Aluminium „ |
| 3 | 5 | „ „ „ | Dental Alloy. |
| 2½ | 5½ | „ „ „ | Delta Metal. |
| 2½ | 6 | „ „ „ | German Silver. |
| 4 | 7 | „ „ „ | Hard Platinum. |
| 4 | 8½ | „ „ „ | Steel. |

Wire No. 52, S.W.G., ¾ inch long.

TABLE *to show the comparative value of Cements in Pivoting.*

When the pin was packed with—

| | |
|---|---|
| Red gutta percha it pulled out at | 9 lbs. |
| Oliver's „ „ „ | 10½ „ |
| Fossiline „ „ | 100 „ |
| Standard Amalgam firm at | 150 „ |
| Sullivan's „ „ | 160 „ |
| Rock Cement „ | 170 „ |

Wire No. 51, S.W.G., screw 44 thrds.

useful; first, to test the comparative stiffness of a number of metals used in making screws, pins, &c., for pivoting.

The other experiments were made to show the firmness with which pins are held by different kinds of cement. A piece of iron one-half inch wide, three inches long and one-quarter inch thick, had one-quarter inch holes drilled in a line and each hole tapped; in the centre of each a pin with eye attached was retained by cement, and after an interval of twenty-four hours the force required to extract the pin was taken by a registering balance, and is shown in the table.

Of course, we get a better result in an experiment of this kind than we can hope for in the mouth, but it shows that the ordinary practice of using oxychlorides and oxyphosphates for supporting he pin is correct, making the necessary provision for the exclusion of moisture.

Dr. Miller: We must not accept these experiments as a positive guide as to the comparative value of different cements, as the conditions are not the same. A pin in a pivot tooth is subjected to lateral motion, and the cement becomes disintegrated on the surface.

Dr. Elliott: True, but the surface should always be of something other than the white cements—amalgam or gold—this will prevent the solution as well as disintegration. The elasticity of gutta percha is a more theoretical than real advantage; certainly that crown which is most rigid will be most durable. Gutta percha may last indefinitely where there is but little work for the crown to do, but where there is work the more solid the better.

### Last Session.

Dr. Bödecker: You know, gentlemen, that an effort has been made to raise a fund for the family of the late Dr. Webb. I am sorry to say that fund has reached but a small figure. It would be a good thing if this Society were to contribute something: it would be a good example to those at home.

Dr. Sach: I move that the sum of 500 fr. be sent by this Society to the family of the late Dr. Webb.

Dr. Elliott: I second the motion.

The motion was put and carried unanimously.

A paper was presented by Dr. W. C. Barrett, New York, on "Bogus Diplomas," upon which a discussion followed.

After some formal business was transacted, and the place of next meeting (Berlin) fixed, the Session terminated.

## JOURNALISTIC SUMMARY.

### NEW ENGLAND JOURNAL OF DENTISTRY *(July, SPRINGFIELD).*

"THE SEPTIC THEORY OF DENTAL CARIES," by Dr. F. Searle. This was the subject of a paper read before the Connecticut Valley Dental Society, in June last. The author refers to the investigations of Underwood and Mills in relation to organisms, the discoveries of Dr. Bödecker in relation to the distribution of living matter, the observations of Dr. Abbot respecting the evidences of inflammation in diseased dentinal fibrils, Professor Mayer's experiments made in the line of analysing decayed dentine —bearing directly upon the chemical aspect of the question of caries—,and to Dr. Miller's investigations regarding the action of micro-organisms in connection with dental decay. The author then proceeds :—

Two questions here arise :

1. Is the tooth endowed with living matter capable of taking on inflammatory action ?

2. Is there evidence to conclude that the results of inflammatory processes in dentine are analogous to those in bone and other tissues ?

In answering the first question, I will refer you to the discoveries of Professor Heitzmann in relation to the reticular structure of protoplasm, which connects every tissue and organ as it were into one large amæba, and to the researches of Dr. Bödecker concerning "The Distribution of Living Matter in Human Dentine, Cement and Enamel," together with the evidence which your own experience furnishes in your operations upon the teeth. If these, united, do not bring evidence to your minds sufficient to make you give an affirmative answer, ask your patients. Do not think, because these tissues belong to the microscopic world, that they cannot be injured and take on inflammation. All normal and abnormal life action, whether growth or decay, the building up or the taking down of molecules and tissues, belong to the microscopic world. If you discard the vital changes in one set of tissues, why not in all ? Yes, there is the intensest vitality in the reticular matter of a tooth. To talk of its low vitality is to contradict the plainest evidence that can be brought to the human intellect.

In answer to the second question, if you admit the self-evident fact of its ability to live and grow and be healthy, you must also admit its liability to disease.

This brings me to the consideration of the inflammation theory of Dr. Abbott.

It has been shown in the laboratory of Professor Heitzmann that dentine has been dissolved and formation of abnormal tissue has taken its place. This has taken place by true physiological, though abnormal, vital processes. When Dr. Abbott was making his investigations in connection with Dr. Bödecker in regard to living matter in teeth, he observed in the diseased fibrils of the tooth appearances characteristic of the presence of inflammation in other hard tissues, which he thus describes:

On the hypothesis that acids produce the irritation of the living matter—the reticulum—at the border-line of decay, why should they not also decalcify the lime-salts at this line? Professor Mayer finds no trace of acids there, and Dr. Abbott accepts the conclusion that they are not there. How, then, can acids set up inflammation? When the germ theory is accepted, the presence of acids at this point will be unnecessary to account for the agents of irritation. With vital organisms feeding upon and multiplying within the pabulum contained in the canaliculi, exhausting and injuring the reticulum, which is directly connected with the reticulum of the pulp and the whole system of tissues, the usual effects of irritation follow until the melting down of the formed material, the liberation of the lime-salts from its meshes and the death of the reticulum put an end to the vital reaction, and the mass is given up to the action of organisms and their products.

The facts already presented are sufficient to establish the septic character of the disease affecting the albuminous or "animal" portions of dentine where caries is present.

In another article I shall present some of the facts already discovered in regard to the action of pathogenic organisms on soft tissues, and also examine the chemical theory which teaches that caries is simply the decalcification of the dentine by acids.

"The Combination of Amalgam and Oxyphosphate," by Dr. F. Y. Clark. Mix any amalgam in the usual way ready for use, and then with a spatula and glass slab thoroughly incorporate with any good oxyphosphate cement and accompanying liquid until the mass assumes a light greyish appearance and about the consistency of putty; then press into the cavity. When sufficiently hard to bear trimming, remove the outer surface below the margin of the cavity walls, and replace and finish with some good amalgam that will not discolor, and at the end of a few days finish and polish. The amalgam and oxyphosphate should be mixed so as to approach as near as possible to one part of the former to three parts of the latter, just enough of the first to unite with the surface filling, which should be introduced in small pieces and burnished against the main filling of oxyphosphate and amalgam, so as to unite. My attention was called to this combination of cement and amalgam several years ago by Dr. Samuel A. White, of Savannah, Georgia; but on trial it was found to wash or waste away on the surface; but if used as proposed it acts admirably and removes to a considerable extent many objections to the use of amalgam.

### INDEPENDENT PRACTITIONER *(September, NEW YORK).*

"DENTAL EDUCATION." Under this heading is taken up the question of the irregular issue of Dental diplomas by certain of the American colleges. Considerable space has also been occupied by the subject in the June, July, and August numbers. The two institutions that are accused in the present instance are the Baltimore College of Dental Surgery and the Dental Department of the University of Maryland. Among those to whom a D.D.S. was given by the former college was a certain practitioner in London, whose practice and advertising are notorious, and "who received his diploma, so says 'Dame Rumor,' by proxy, and, of course, *in absentia*."

In Germany, too, the effects of this diploma traffic are keenly felt. Dr. Adolf Petermann writes: "In September of last year a *barber* of this city, who had also been employed but a short time previously as independent dental operator, went to the United States of North America and entered a Dental college much frequented by Germans. He attended English lectures from November until February, and —— graduated as D.D.S. But, in spite of this, the man can scarcely read a few words in English, to say nothing of being able to follow an English lecture. A large number of such men are already practising in the German Empire as 'American Doctors of Dental Surgery,' graduated by *legally incorporated* colleges. . . . . It is only too evident that, unfortunately, under such conditions, the innocent ones—and there are here in Europe certainly a great many excellent men among the American Dentists—must suffer."

An editorial article upon this subject contains the following observations: "The degree of Doctor of Dental Surgery is distinctively an American degree. Dental Colleges exist nowhere, save in America. It was their organization that placed American dentistry ahead of the world. As long as students were required to complete a full curriculum of study, and none but those possessed of the requisite preliminary qualifications were permitted to matriculate, we easily maintained our lead, and foreign students resorted to our schools to finish their professional education. In an evil hour some of our colleges agreed to accept twelve years' practice as the equivalent for one term of schooling. The downhill road once entered upon, further reductions soon followed. The practitioner of *five* years' standing was accepted as a second year student. *Facilis descensus Averni*, and soon the five year practitioner was only required to show himself occasionally at lectures. It was but one step further to allow the practitioner to present himself for graduation upon a mere examination at the close of a term, and this in many cases degenerated into a mere form. There was but one deeper depth in college degradation, and the diplomas of regularly chartered schools were soon almost openly offered for sale. . . . To their credit be it said, a few of our colleges had not bowed the knee to the golden calf, but had stoutly maintained their integrity, and refused to grant their honors to any, except such as had spent the requisite time within their walls. . . . True to our resolution, the charges brought in our June number were published, although they involved the names of some of our best friends. It was not in enmity to them, or in hostility to the Baltimore College, that we gave the article place. There was a principle involved that we deemed of vital importance to the profession. . . . We believed the granting of other than honorary diplomas to even the most reputable Dentists, upon a mere examination, was vicious in principle, and demoralizing in its tendency. We were quite as certain that the allowing of five, or even ten years' practice, as the equivalent of one course of lectures, was almost equally wrong, and we thought that when specific cases were presented the profession would not be slow to perceive it. The victory has come sooner than we anticipated, for the colleges themselves have recognized the propriety of the principle, and have not waited for the voice of the profession to be heard. . . . Should any of the schools, after the session of 1884-85, go back to the old standard, the *Independent Practitioner* will publish every well attested instance, and warn the profession against them. . . . In conclusion, it is but fair for us to state our opinion, that if the Baltimore College has been guilty of any 'irregularity' in the granting of degrees, it was one that was far too *regular*, for while it does not deny the conferring of diplomas *sine-curriculo*, it has but followed a practice that has become too general among our schools, and one that it did not orginate; a custom that dates back for years, but which, in common with other institutions that have pursued the same course, it now definitely agrees to abandon."

# Editorial.

## THE L. D. S. I.

THE new curriculum for the Licence in Dental Surgery of the Royal College of Surgeons in Ireland, which is published on page 451, will be read with satisfaction.

The old Dental curriculum of this College was far below the requirements of the Medical Council, and we believe there has not been one instance of examination under it. These new regulations for professional education and examination exceed even those of the Royal College of Surgeons of England, which have always been more extensive than the mere recommendations of the Medical Council. The additional items are, a course of Practical Physiology; a second course on General Surgery; and an extra six months' General Hospital Practice; besides three examinations at different periods during the educational course.

The object of adding more subjects to the curriculum, of extending the scope of the examinations, and increasing the fees, may be fairly assumed to be to raise the status of the L.D.S.I. Such an effort is undoubtedly needed. But there can be no question that, with nearly 400 Licentiates *sine curriculo*, and not one *cum curriculo*, and for other reasons that need not be mentioned here, candidates who comply with the educational requirements will be slow to appreciate any additional value that may be claimed for the L.D.S.I. Some time must, therefore, elapse before the Irish College can redeem the position into which it has brought itself with regard to the Licence in Dental Surgery.

The last paragraph (page 456) is not too assuring. It reads thus :—" These bye-laws shall come into effect from and after 1st day of August, 1884. But the Council of the College reserve the right of making such modifications, as may seem to them reasonable, in favour of students who shall have commenced their studies before that date." Does this mean, notwithstanding the statement of the last paragraph on the previous page, that modifications may be made in the nature of the examination of certain *sine curriculo* candidates? This should be explained; for the candidate who may have complied with all the expensive educational requirements will probably look for assurance that the dignity and status which the degree is now expected to assume will be maintained.

All Licentiates in Dental Surgery of this College have signed a declaration as to professional conduct. In many instances that declaration is defamed. Licentiates continue to violate the terms on which they obtained and hold their diplomas. By their unprofessional advertising they bring the College of Surgeons in Ireland into disrepute. To remove this stigma, and facilitate the higher status evidently now sought for the L.D.S.I., the College should exercise its powers and purge its roll of Dental Licentiates of all such transgressors. High fees, and many steps to the front door, will not compensate for loose back premises and faulty internal arrangements.

## PASS LIST.

### ROYAL COLLEGE OF SURGEONS, EDINBURGH.

During the July sittings of the Examiners the following gentlemen passed their First Professional examination for the Licence in Dental Surgery:—Benjamin John Douthwaite, London; Thomas Prittie Ritchie, Edinburgh; David Browne, Montrose; William Hopper Harrison, British Guiana, and Andrew Burns, London.

James Main Nicol, London, passed his Final examination and was admitted L.D.S. Edinburgh.

### FACULTY OF PHYSICIANS AND SURGEONS, GLASGOW.

At a meeting of the Dental Board, on July 23, Henry J. Kluht was admitted a licentiate.

The Manchester Dental Hospital has now become absorbed by the Victoria Dental Hospital of Manchester, situate at 98, Grosvenor Street. Though students may be able to obtain practice at this Hospital, the necessary lectures will be delivered at Owen's College.

## ANSWERS TO CORRESPONDENTS.

A Constant Subscriber.—It is not necessary for assistants to be registered; but to use the title Dentist, to imply that you are registered, without being registered under the Dentists' Act, is punishable.

Inquirer.—Read the "Suggestions to Students" in the September (Students') number of the *Record.*

THE

DENTAL RECORD.

VOL. IV. NOVEMBER 1, 1884. No. 11.

## BOOK REVIEWS.

A SYSTEM OF ORAL SURGERY, by James E. Garretson, M.D., D.D.S. Fourth edition. Thoroughly revised, with additions. Philadelphia and London: J. B. Lippincott & Co.

A WORK which has already gone through three editions must be pretty well known. This applies to Garretson's "Oral Surgery," and especially so in the United States. The present book is enlarged by the addition of several new chapters on subjects not embraced in previous editions. Illustrations to the extent of seventy-five new cuts have been added. Each part of the volume has been rearranged, rewritten, or complemented. This fourth edition, therefore, consists of 1,037 pages, 616 woodcuts, and nine lithographic plates, each containing several illustrations. The teachings and demonstrations having been prepared specially for the guidance of students and practitioners of oral surgery, the author offers them as a result of thirty years of practice.

The author says "Oral Surgery, viewed as a specialty in medicine, claims to treat of the various lesions associated directly and indirectly with the mouth, jaws, face, teeth, and associate parts." The limitations of Oral Surgery as here set forth are wider than those of Dental Surgery as practised in the United Kingdom. Dental surgery is generally regarded in this country as embracing the study and treatment of diseases of the teeth and of their contiguous structures—"contiguous structures" include neuralgia connected with the dental branches of the fifth nerve; impacted teeth; odontomes; dentigerous cysts; diseases of the gum and alveolar process, including simple tumours, chronic abscess, necrosis, and dental diseases of antrum; the use (local and constitutional) of such therapeutic agents as the treatment of those diseases requires, this implying the administration of anæsthetics.

Notwithstanding this more extended scope of the work, the whole of the subject-matter has particular interest for the Dental Surgeon.

In the anatomical description of the superior maxillary bone (page 28) it is stated: "The tuberosity of the bone, occupied in part by the wisdom tooth, is a point of surgical interest,—it being not at all uncommon to have necrosis of this portion, the result of an ostitis, induced and kept up by an imprisoned dens sapientiæ. Standing, as it seems to do, tubercle-like, it is plainly evident that neither deformity nor harm would result from its separation as a sequestrum." On turning to the account of the use of the elevator, at page 398, the reader will find this sentence: "When wisdom teeth are but ordinarily adherent, this is a reliable instrument for their removal; care, however, is necessary that it shall not slip from the tooth and inflict injury on the neighbouring parts." Again, on page 403: "Roots of the molar and wisdom teeth, superior and inferior, are removed on a common principle. In the use of the elevator, a very happy result is not infrequently secured by applying the blade to the inner face of the root, carrying the shank across the mouth and making a fulcrum of some convenient opposite tooth." Some words of caution ought to be given regarding the use of the elevator in extracting upper third molars. The tuberosity of the bone is very porous and is liable to fracture, especially in using the elevator upon the wisdom tooth. The teaching in our English schools is against the use of that instrument for that particular tooth. Tomes, Coleman, Sewill, and others, consider it undesirable, as a rule, to use the elevator for the extraction of the upper wisdom tooth; Coleman pointing out the possible detachment of the hamular process along with the tuberosity, and consequent deafness ensuing. This work is "prepared specially for the guidance of students," and it is especially to students that such warning should be given. Doubtless, the elevator may, in rare cases, be of service in this particular region; and the present reviewer, whenever he has occasion to so resort to it, always takes the precaution to support the tuberosity with a finger of the left hand.

The description of the structure of the oral mucous membrane might be happier, and in many details more accurate. The statement of the general distribution of it is intermingled with items of structure, thus marring system and descriptive force. Here it is stated "the vessels being supported by and in cellular tissue;" "cellular tissue" is intended to mean the fibrous connective tissue. Old erroneous notions of histology and development should not be handed down by the use of terms expressing wrong ideas. The announcement on page 475, that the "gums are simply an amount of fibro-cartilaginous tissue," is not in keeping with the descriptions given by reliable histologists of the structure of the gum—they neither mention nor illustrate cartilage elements. Then, again, in dealing with the several kinds of epithelial covering to this membrane, nothing is said of the various forms assumed by the squamous cells in their different stages of development—in the deeper parts where the cells are somewhat columnar, and as they approach the surface they become scale-like and cornefied. Columnar epithelium is stated to be "found in the air passages;" that is not so. The air passages, down to the infundibula, are lined with columnar-ciliated, and the ultimate alveoli with squamous, epithelium. A similar error occurs on page 65, where it is said the mucous coat of Steno's duct is "lined with ciliated epithelial scales." It should be columnar epithelium. In speaking of the relations of Wharton's duct, the author omits to mention the fact of its lying upon the hyo-glossus muscle, having the lingual nerve above, and the hypo-glossal nerve below. The foregoing shortcomings have been observed in reading the first sixty pages, and their significance need not be commented upon.

Notwithstanding the weight of evidence against the gustatory branch of the third division of the fifth nerve possessing the special function of taste, the author retains the old view, which is in the affirmative.

In little more than two pages of letter-press the minute structure of the tooth tissues is disposed of. Incompleteness is as apparent as is brevity. Nothing is said of the cells of the pulp; nor of the nature of the dentinal tubes; nor of their contents, save the very vague expression, "The tubuli . . . . approach the pulp, opening into the cavity by capillary mouths, and thus receive the halitus which is their nutrition." On turning to the surgical section which treats of capping exposed pulps and the reparative action which follows, the presence and function of the odontoblasts is not alluded to; and dentine of repair is said to be produced by a secretory process, the account of which is more obscure than clear. Also that which is written upon the morbid anatomy of dental caries and the relation and condition of the tubes, is like the section dealing with the anatomy of the dental tissues. Indeed, of many of the subjects treated, pathology is weak.

The account of the development of the teeth is peculiar. An enamel germ and enamel organ have no existence. The developing germ (p. 93) carries with it the overlying mucous membrane, called the tunica propria ; there is also an alveolar envelope similar to the lips of the dental groove of Goodsir, and this forms a second envelope—tunica reflexa. " Before the attainment to full size by the (dentine) papilla, there existed between it and its sac proper a halitus. This halitus, now that the congeries of cytoblasts or nucleated granules have obtained their full growth and secretive power, is replaced by a more highly endowed production, the work of matured cells. This secretion constitutes the future dentine. Calcification is progressive with secretion. . . . The formation of dentine completed, the covering of it with enamel begins, or rather this deposit is, to a degree, coincident with the dentinal formation. Secreted by the same pulp which forms the dentine, the same secretion, some portion finds its way into and through the primary sac. As it passes through this sac to be moulded against the second it is modified by the epithelial surface, which constitutes the outer face of the tunica propria ; this sac, as it is understood, being a mucous membrane. Between the enamel thus formed and the dentine exists the primary sac : simply the modified mucous membrane, which we first saw as overlying the papilla. The sac of mucous membrane—tunica propria, as it is termed—continues to exist between these two hard bodies, and receives and modifies, for the support of the enamel, the liquor sanguinis found in the dentinal tubules and intertubular structure. This tunica propria is the enamel membrane. It is from this that we receive impressions of pain when it becomes exposed by a break in the continuity of enamel. . . . The whole tunic is persistent. . . . From this tunic it is, as understood, that the enamel receives its whole nourishment ; it acts also as a part-feeder of the cementum."

" Accepting the process of tooth development as here exhibited, it becomes understood that enamel has no special pulp, as propounded by the histologists. It is also understood that it calcifies from the outside inward, and not from the inside outward. It is as well seen that it is a vital tissue, nourished exactly as are other parts."

"This is a very simple and easily understood explanation of tooth growth. The observations leading to the conclusions have been somewhat extensive, and the phenomena are certainly endorsed by general anatomical analogy. Let them be objected to, however, as perhaps they will be, by the physiologist, they are irrefutable as all surgical relations with the teeth are concerned."

This account of the development of the teeth is peculiar. The author advances it despite the generally accepted teachings of the histologists, and the anticipated objections of the physiologists.

In this review there have been noticed some errors, omissions, and peculiarities, which have been observed during the reading of only a portion of the book. Notwithstanding even these shortcomings, there is much in the work that is valuable to the student as well as to the practitioner.

T. G.

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THE MOUTH AND TEETH IN HEALTH AND DISEASE, by J. Morley Dennis. London: Simpkin, Marshall and Co.

THIS book contains fifty-three pages, divided into nine chapters. It has been written for the general reader. The author "has long observed the very limited knowledge possessed by the public concerning the teeth, and has endeavoured to give, in as clear and concise a manner as possible, sufficient information to enable them to judge when to consult the Dental practitioner." If the style were easier the writing would be better understood. Many grammatical improvements could also be made with advantage, *e.g.*, the first and last sections of the concluding paragraph of the Preface do not harmonise. In the first paragraph, too, the attention is arrested by the statement, "While deformities and irregularities of the mouth and teeth," &c. In this direction improvement could likewise be made by a more correct punctuation, and by some of the sentences, which are nearly a page in length, being shortened.

The denunciation of professional advertising, and the division of Dental practitioners into two classes—advertisers and non-advertisers—setting forth the objectional and derogatory aspects of the former, is to be commended.

At page 9 it is stated that the mouth "displays the wisdom and beneficence of the Creator, who created our bodies with a combination of multitudinous parts, acting in sympathetic unison." To a reader with even less agnostic mind than Mill, or to one who appreciates the significance of rudimentary and abortive organs; or to the observer who sees the struggle going on in the mouth, as well as in other situations, between the relatively normal functions and the myriads of agents working evil and causing disease to prevail, to such an one that poetic remark may not fail to excite a smile. Then, again, at page 11, the author exalts to the beatific degree of a "blessing" the function of mastication, despite the substances triturated—forbidden fruit or flesh.

One or two errors in the description of the structure of tissues may be pointed out. It is stated on page 19 that "minute nerves and blood-vessels pass into the cementum" of the human teeth. That tissue, like the other hard tooth structures, is not vascular. Also, in speaking of the tooth pulp, no mention is made of the very important cell elements which it contains.

Sufficient stress is not put upon the importance of retaining the temporary teeth till their successors are imminent; and nothing is said of the value of filling carious members of that series. The use of a solution of alum as a mouth wash, as recommended on page 53, should not be resorted to where natural teeth exist. The sulphuric acid set free is too destructive when so used.

Though there are not a few peculiarities and shortcomings, the brochure will be of use to those for whom it is intended.

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A Suggested System of Dental Notation, by George Cunningham, D.M.D. London: The Dental Manufacturing Company.

Dr. Cunningham s system of notation for the use of Dentists in recording operations consists of a "Daily Dental Recorder" made up of "a number of sheets appropriately ruled for the name, address, the number of the tooth, the operation, the time occupied, and the usual debtor and creditor columns, and a convenient space for memoranda, together with a chart for the location of the operations, mounted in the familiar manner of a sketching block, which facilitates its use either at the desk or at the chair. On the back of the block is a table of symbols, arranged in proper order, so as to facilitate ready reference. There is no necessity, therefore, to burden the memory with all the various symbols, as, whenever recollection fails, one has only to refer to the back of the block to find the appropriate symbol. One or more sheets may be devoted to one day's operations, or if need be, two or more days' operations may be contained on the same sheet, according to the requirements of the practice. At the end of the day the uppermost sheet is removed, and may be at once either mounted on a file or pasted into a guard-book, and a collection of such successive sheets can thus be used as a day-book or journal."

In addition to the "Daily Dental Recorder," or day-book, is a ledger. Into this is carried only an abstract of the operations in the daily sheet. "Each folio is devoted to one account, so that when the ledger is open the record of no other patient's case is exposed to inquisitive eyes. On the left-hand page are several lines devoted to the name and address, or addresses, of the patient, with a convenient space for notes, as to reference to whom the account is to be rendered, the name of the former Dentist, and that to whom they may be recommended on leaving. . . . The chart represents a diagram of the teeth, upon which the different fillings may be graphically located, and is printed in blue, so that red and black ink may be conveniently used. Gold fillings are indicated in red ink, amalgams in black, and plastics by a black outline. A convenient method of representing a combined stopping of a metal over a plastic filling material is by circling it with an outline in red or black, according as gold or amalgam is employed. At the end of the ledger a certain number of pages, intended to be devoted to young patients, are provided with a second chart of the deciduous teeth. . . . The specimen page of the ledger shows the manner of recording a series of operations in the fullest detail."

The foregoing descriptions are taken from Dr. Cunningham's "Notes on the Application of the Dental Notation to Professional Book-keeping." These "Notes" set forth the advantages to be obtained from keeping a minute account of all operations. Several practitioners who have adopted this system of recording their operations testify to its usefulness and to their appreciation of it.

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An instance of extreme dilaceration has been communicated by Mr. A. Aaronson, L.D.S. Eng. The specimens were extracted from behind the upper incisors of a youth seventeen years of age, and they are described as resembling in form human feet.

# ELECTRICITY: AND THE ELECTRIC LIGHT: IN REFERENCE TO DENTISTRY AND SURGERY.

By C. J. Boyd Wallis, L.D.S. Eng., &c.

## Part XII. Thermo-Electricity.

In the *Thermo-pile* or battery, heat takes the place of chemical oxidation in keeping up the supply of electricity. It is based on the discovery of Professor Seebeck, of Berlin, who, in 1822, showed that when two different metals are soldered together, so as to form a closed ring or circuit, and one of the junctions is heated more than the other, an electric current is set up in the circuit, and the current is maintained so long as the difference of temperature continues. This current may be increased by the addition of a number of pairs of metals, just as it is increased in the voltaic cell by the addition of two or more elements. The electromotive force set up at the heated junction obeys the following laws:—

1. "The thermo-electromotive force is, for the same pair of metals, proportional to the excess of temperature of the junction over the rest of the circuit."

2. "The total thermo-electromotive force in a circuit is the sum of all the separate thermo-electromotive forces at the various junctions."

Seebeck found that the various metals could be arranged in series, according to their thermo-electric power, each one in the series being thermo-electrically positive (as bismuth is to antimony) toward the one lower in the list.

The following is the thermo-electric order of metals, for temperatures usually ranging between about 40° and 100° F., as arranged by Matthiessen. If the electromotive force of the thermo-electric current excited between silver and copper be taken as equal to 1 (the current passing from the silver to the copper at the heated junction), the force of the current between silver and each metal in succession heated to the same point will be represented by the numbers given in the following table. Where the positive sign (+) is prefixed, the current is from the silver to the other metal at the heated junction; where the negative sign (−) is prefixed, the current is from the other metal at the heated point towards the silver.

### THERMO-ELECTRIC ORDER OF METALS, &c.

| | + | | − |
|---|---|---|---|
| Bismuth | 24·96 | Gas Coke, hard | 0·057 |
| Cobalt | 8·97 | Zinc, pressed | 0·208 |
| Potassium | 5·49 | Copper Voltaic | 0·244 |
| Nickel | 5·02 | Cadmium | 0·332 |
| Palladium | 3·56 | Antimony, pressed wires | 1·897 |
| Sodium | 3·094 | Strontium | 2·028 |
| Mercury | 2·524 | Lithium | 3·768 |
| Aluminium | 1·283 | Arsenic | 3·828 |
| Magnesium | 1·175 | Calcium | 4·260 |
| Lead | 1·029 | Iron, piano wire | 5·218 |
| Tin, pressed wire | 1·000 | Antimony, axial | 6·265 |
| Copper Wire | 1·000 | Antimony, equatorial | 9·435 |
| Platinum | 0·723 | Red Phosporus | 9·600 |
| Iridium | 0·163 | Antimony, cast | 9·871 |
| Antimony, pressed wire | 0·036 | Alloy, 12 bismuth, 1 tin, cast | 13·67 |
| Silver, pure | 0· | Alloy, 2 antimony, 1 zinc, cast | 22·70 |
| | | Tellurium | 179·8 |
| | | Selenium | 290·0 |

Hence, of these metals, bismuth and selenium produce the greatest E.M.F.; but from the expense of the latter, its low conducting power, and the difficulty of making good joints, antimony is generally preferred.

It may be remarked here that the thermo-electric order of the metals is entirely different from their voltaic order. According to the experiments of Wheatstone and Pouillet, who have arrived at the same result by very different methods, the electromotive force of a pair of bismuth and copper, when one junction is maintained at 212° and the other at 32° Fah., is $\frac{1}{95}$ of that exerted between a pair of copper and zinc plates arranged in voltaic relation, as in Daniell's battery. Impurity of metals may make a great difference in their thermo-electric power, and some alloys, and some of the metallic sulphides, as galena, exhibit extreme thermo-electric power. The E.M.F. given by a single pair of metals is very small. According to Professor S. Thompson, if the junction of a copper-iron pair be raised 1° C. above the rest of the circuit its E.M.F. is only 13·7 millionths of a volt (*i.e.* 13·7 microvolts). That of the more powerful bismuth-antimony pair is for 1° C. about 117 microvolts.

THERMO-ELECTRO OR THERMO-PILES.—To increase the E.M.F. of thermo-electric piles, a number of pairs of metals are joined in series, and so arranged that the alternate junctions can be heated

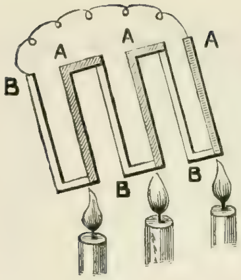

Fig. 64.

as shown in Fig. 64 at B.B.B., whilst the other set, A.A.A., are kept cool. In a bismuth and antimony pair, the bismuth is the positive metal but the negative pole, and the antimony is the negative metal but the positive pole, and the current goes from bismuth to antimony across the junction.

Generators of electricity have been constructed on the above plan by Becquerel, Noë, Clamond, and others ; but owing to the difficulty in maintaining them in effective action for any length of time, probably owing to a permanent molecular change at the junctions, they have not come into general use. The latest and most efficient are those of Clamond, and M. Sudre, of Paris ; these have been used for telegraphic purposes, and also for electroplating in the note-printing department of the Bank of France. The Clamond pile is still employed in the workshops of M. Goupil ; and it has been successfully used for lighting a workshop in the Rue Saint Ambroise.

The characteristic features of the Clamond pile are the construction and arrangement of the elements, and the manner in which they are heated.

In the improved form of this pile the negative element consists of an alloy of two parts antimony and one of zinc, cast in a flat spindle-shaped bar of about 3 inches in length, by $\frac{3}{8}$ in. in thickness. The positive metal is a thin strip of tin plate which is connected by a notch to the inner end of one negative element, and is attached in a similar way to the outer end of the next element. These elements are so coupled up in a circle, being kept in position by a paste of asbestos and soluble glass ; a series of these circles of elements are piled one above the other, touch being prevented by an intervening ring of the asbestos paste. The several series of elements are then connected by soldering together the positive terminals of one series with the negative of the next. Thin plates of mica are placed between the alloy and the tin-plate, excepting at the point of soldering. The interior of the battery, when complete, has the appearance of a cylinder.

The battery is heated by means of coal gas, admitted through an earthenware tube, which is perforated by a number of small holes. The gas supply is regulated by an automatic arrangement which maintains the temperature at about 200°.

M. Clamond has succeeded in maintaining four electric lights of 220-candle power each at an expenditure of 21 lbs. of coke per hour.

In another form of pile, M. Clamond employs an alloy of bismuth and antimony for one, and iron for the other element. A set of fifty elements are cast for one ring, and these rings are placed one above another in the manner described, sometimes as many as sixty rings being superposed in one battery. The rings, like the elements, are connected in series, and the current obtained at the poles of the pile is the sum total of all the elementary currents.

The outer joints of the elements are kept cool by radial plates of copper, which expose a large cooling surface to the air. Thus the mean temperature of the heated face of the pile is kept at 360° Centigrade, and that of the cooled face at 80° C. Such a battery of sixty rings, or three thousand elements, when heated to the degree named, yields a power about equal to a Bunsen battery of sixty large cells. The E.M.F. would be, strictly speaking, 109 volts, and the internal resistance 15·5 ohms. Two such batteries of sixty rings connected in series will supply two Serrin electric lamps, each of four to seven hundred candles.

SECONDARY BATTERIES OR ACCUMULATORS.—The inventors of electrical apparatus have not been idle as regards their production of novelties or improvements of "accumulator" batteries. The number of patents issued during the last few years for these so-called improvements is surprising: they are becoming as numerous as those for galvanic cells themselves. There is a strong family likeness amongst all of them, and although a simple list of the patents granted for improvements and modifications of the Planté cell would occupy a considerable amount of space, probably a description of those actually in use for practical purposes would not occupy many pages. The practical value of the "marvellous box of electricity," to which attention was called in May, 1881, by Sir W. Thomson in a letter to *The Times*, in which "a million foot-pounds of energy" had travelled from Paris to Glasgow, and which was claimed to be the "practical fruition" of electric storage, that was to do "for the electric light what a cistern in a house does for an inconstant water supply," is at the present moment almost nil from a financial point of view. The public—excited by the accounts given in the daily press of this newly-born wonder of electric science, forgetting or ignorant of the fact that the large-sounding million foot-pounds only represented the potential energy of about 1½ ounces of coal or the energy developed by an ordinary steam engine with 1 lb. of coal—became deeply interested, and the million foot-pounds of energy was quickly converted into a million pounds sterling of capital, which was invested in various companies to work the new idea; but although the problem of accumulating and storing up electricity had been undoubtedly solved, the important part of the programme, that of accumulating wealth by this means, still remains unaccomplished.

The effects on which the action of secondary batteries depends have long been known. Galvani, in 1795, noticed that when shocks from an electric eel were given to the nerves of a frog it was possible to obtain an electric shock by holding the leg of the frog in one hand and touching the nerves with the other. Galvani, in his note-book (which was an interesting exhibit at the Electrical Exhibition in Paris, 1881), gives an account of these experiments, and supposes "that the electric eel had transmitted a part of its electricity to the frog, which was capable of holding the charge and giving it out again," and he even supposes that this might be repeated when desired. In 1801 Gautherot, a French chemist, observed that when wires of silver or platinum were used for the decomposition of the acidulated water, the two wires gave a current of electricity after they were detached from the battery. This he termed the polarization current, and the effect was said to be due to polarization. In 1803 Ritter, of Jena, observed the same phenomenon when using gold wires for the decomposition of water, and it occurred to him to devise a battery for producing and making use of these secondary currents. For this purpose he employed various metals, and succeeded in getting strong effects with platinum and silver wires; and although he tried lead, the metal largely employed at the present time, he did not succeed with it, owing to his having used a solution of chloride of lead, which acted as a non-conductor, or offered too high a resistance to produce any effect which could be observed. Ritter employed a secondary battery of fifty cells, which he charged by means of Volta's pile of one hundred couples, and with this he produced different chemical and physiological effects, similar to those produced by the original battery. Thus, three years after the discovery of Voltaic Electricity, he had discovered and made use of a *secondary battery*.

Different theories were started in explanation of the action of these batteries, the first being that some of the supposed electric fluid was soaked up by the plates; or, in other words, that it was an action of surfaces receiving charge, and that the secondary pile was in fact strictly analogous in its action to a condenser. The investigations of Volta, Marianini, and Becquerel gave clearer ideas of this secondary action; and in 1825 De la Rive stated the action was due to an affinity or combination of the elements with the electric currents, but he does not admit that there is successive decomposition and recomposition going on in the course of the electric currents throughout the liquid, but regards the decomposition as only taking place at the poles.

Thus far had opinion gone in 1825, and nearly all that is known now was discovered years ago. Among the early applications of the theory may be mentioned that of Mr. Cromwell F. Varley, who employed a series of zinc and carbon plates mercurialized (the Marie-Davy cell reversed) to take a slow, small charge and deliver it up in a short, powerful current for transmitting time signals in connection with the Post Office. These cells consisted of two carbon plates standing in troughs of mercury, with sulphuric acid 1 to 4 of water saturated with zinc sulphate; twenty cells slowly charged from 150 Daniell's of high resistance gave an arc of ½ to ¼ inch for twenty minutes.

In 1859 Gaston Planté, the learned French physicist, established the scientific principle upon which the innumerable secondary batteries of recent date are designed. M. Planté, having studied the subject exhaustively, published the results of his labours to the world. His work was thoroughly well done and with little profit to himself, while others, taking advantage of his labours, have patented every conceivable form of his battery, and in some cases enriched themselves to the extent of thousands. But Planté's name will live in association with the secondary battery when all others are forgotten.

M. Planté's secondary battery consists of two concentric cylinders of sheet lead, which do not touch, and are immersed in dilute sulphuric acid; it is formed on a system by which he greatly increased the capacity of the plates.

In 1879 Messrs. Houston and Thompson suggested a gravity form of the Daniell cell for electric storage, but it was in 1881 that public attention was really drawn to the subject by the letter of

Sir William Thomson which was addressed to *The Times* in May of that year, announcing the receipt of the "marvellous box of electricity" already alluded to.

This "wonderful box" was the invention of M. Faure, and was in reality a Planté battery, upon the lead plates of which a coating of red oxide of lead, minium, had been deposited, and held to the surface by means of a wrapping of felt. This addition was adopted in order to arrive at a quicker result in the formation of the battery by doing away with the need of the tedious process of "formation" by the aid of the electric current, also for giving a greater capacity in the same space, by means of the larger bulk of the oxide ready for immediate action. It was at once claimed for this cell that, weight for weight, it had forty times the capacity of the Planté; but subsequent experiment by skilled electricians reduced this to a very small superiority—in short, to only one and a quarter times the capacity. M. Faure's cell was followed by a host of other inventions, each claiming to be superior to the last, but thus far experiments show that nothing practically surpasses the two lead surfaces in acid of M. Planté.

Mr. G. F. Barker, in his experiments, shows that the E.M.F. is the same in the Planté and Faure cells, while the internal resistance and storage capacity may readily be made the same, yet that the local action is far less when the peroxide is formed by the action of the current upon the lead plate itself, as in the Planté cell, than when it is produced from minium spread upon it, as in the Faure cell. Mr. Barker found that the peroxide was beautifully crystalline and very hard in his Planté cell, and that not a trace of sulphate had been formed in it after six months' use. The Faure cell certainly requires much less time to form it than the Planté, but this is more than compensated by the increased permanence of the latter. With an equal storage capacity, which M. de Kabath has given to his form of the Planté cell, it even surpasses in efficiency the form devised by Faure.

In 1859, then, Gaston Planté began his research upon this secondary action, carefully noting the influence of the metal and of the solution employed, and found the maximum effect was given by lead plates immersed in dilute sulphuric acid; and in the following year he produced secondary batteries of remarkable power by rolling two sheets of lead together, with a strip of felt between them, and placing them in a 10 per cent. solution of sulphuric acid. This he charged by means of a battery. The oxygen evolved upon the positive plate attacked it and converted its surface into peroxide, the hydrogen for the most part escaping. The current was then reversed, when the hydrogen reduced this peroxide to finely-divided metallic lead, and the oxygen attacked the other plate, producing peroxide. By continuing the alterations of current, the metal may be corroded to any depth and the amount of finely-divided lead and peroxide indefinitely increased. This process of "formation" required three months to perfect. In order to avoid this tedious process of "forming," in which the deposits were produced by the action of the electric current, M. Faure, in 1881, brought out his secondary battery, which was in fact a Planté battery, but in which he arrived at a quicker result by covering the plates at once with a paste of red oxide of lead or minium, held to the surface by means of a wrapping of felt. Upon passing a current through, this red lead was reduced to metallic lead on the one plate and oxidized to peroxide on the other; thus producing the battery charged and ready for use in a single operation requiring only a few hours to accomplish.

The *positive* plate is that which is covered with the peroxide of lead, and the *negative* that which is covered with the metallic lead.

It was afterwards found that the wrapping of felt, or asbestos cloth, &c., employed to bind the material to the plates, all added to the resistance, while they resisted the circulation of the liquid, and ultimately disintegrated. But by the combination of the patents of Swan, Sellon and Volkmar, with that of Faure, these difficulties were overcome, and the battery assumed the form of small masses of the porous material contained in spaces in lead plates, which was effected by making the plates of an open network or of perforated sheet lead.

Four types of the improved form of this battery are now made in Paris, called A, B, C and D. A consists of seven positive plates, each 37 × 23·5 cm. square, and 3 mm. thick, perforated with holes 6 mm. in diameter, every 10 mm. apart; these are interleaved with seven negative plates of the same size only 0·55 mm. thick, peforated like the others; the seven positive plates weigh 16·66 kilograms; the seven negative 2·77 kilograms.

The red lead spread on their surfaces weigh 22·13 kilograms, the two exterior plates being covered only on their interior surfaces, so that there are 26 active surfaces in all. Each plate has an electrode 7 cm. wide. The box is 45 × 20 × 40 cm. in size, is pitched throughout, and weighs, with its cover, 10 kilograms. The battery complete weighs 63 kilograms, and contains, it is claimed, when fully charged, 375 ampère-hours of current delivered at an E.M.F. of 2 volts. Hence it will furnish, for example, a current of 25 ampères for 15 hours. Type C contains 150 ampère-hours. Types B and D are round cells in jars of earthenware. The former weighs 35 kilograms and contains 225 ampère-hours; the latter 8 kilograms and contains 75 ampère-hours.

De Meritens, N. de Kabath, Fitzgerald and Crompton, and Sutton, among others, have made and patented improvements and modifications of the lead secondary battery, but of these Mr. Sutton's only will be noticed, since it is of a different order to the others, consisting as it does of two metals and a metallic salt. It is made up of a lead plate to be peroxidized, and a copper plate to be alternately dissolved and deposited from the solution of sulphate of copper. It is suitable for amateur purposes and small currents, but its E.M.F. is lower than that of lead.

A small storage cell for the use of amateurs, and for bell ringing, &c., designed by Mr. E. Harvey, may be easily made in the following manner:—Two carbon plates and one lead, 3½ in. by 1½ in., are placed in a solution of hydrochloric acid, being arranged as follows: the carbon plates are wrapped with two layers of blotting or filtering paper, the lead plate is then placed in the middle, and the spaces between it and the carbon plates (about ¼ in. each side) filled up with spongy lead. The spongy lead may be obtained by precipitation on zinc plates from a solution of acetate of lead; the spongy mass is then removed from the zinc plates and washed in hydrochloric acid to remove any zinc that may remain, it is then ready for use. In charging, connect the lead plate with the zinc pole of the charging or primary battery. After charging and discharging two or three times, the cell will charge to its full capacity. The secondary cell will work a button-hole incandescent lamp well for from two to three hours after an hour's charge; the delivery is slow and very uniform compared with the ordinary Planté.

*Charging.*—In charging accumulators, all known sources of electricity can be employed, whether primary batteries, thermo-electric batteries, magneto-electric, or dynamo-electric machines. Batteries for this purpose should be constant, economical and durable; the Leclanché cells, for instance, are too feeble in action for charging accumulators practically, the large-sized Daniell cells, and those of Thomson and Regnier, being the most suitable. Trouvé's and other forms of the bichromate batteries can also be used.

The E.M.F. of the charging batteries should be greater than that of the accumulators. Thus, for instance, if ten accumulators connected for tension are to be charged, the E.M.F. of the accumulators will equal about 22 volts (2·2 × 10), and one Daniell cell being about 1·1 volt, it would require at least twenty Daniell cells in tension and practically thirty cells to produce a sufficient charging current. When only a few batteries are available for charging, the accumulators should be connected for quantity.

The *duration of charging* is limited by the capacity of the accumulators and the intensity of the charging current. The capacity of the accumulators depends on the amount of their active surface, and on the quantity, in weight, of refined lead and peroxide of lead, which render effective service in the production of the current during the discharge.

In *arranging accumulators for charging*, the positive pole of the secondary battery must be connected to the positive pole of the primary battery, and the negative pole of the primary battery to the negative of the secondary battery.

In determining when the accumulators are fully charged, they may be considered, for all practical purposes, as charged when all the accumulators exhibit activity in the disengagement of gas freely, for then they show that they are unable to store any more of the electric energy passed through them; consequently, the evolution of gas is "force" wasted, therefore no injury is done to the accumulators by overcharging, since by continuing the charge beyond a certain time is only a waste of energy.

*The electromotive force* of such cells as the Faure and De Kabath is about 2·25 volts immediately after charging, but falls spontaneously to 2 volts. The quantity of electricity which an accumulator can yield practically is much inferior to what it can store in reality; it constitutes a reservoir which cannot be completely emptied, because the pressure or E.M.F. towards the end becomes too feeble on account of secondary phenomena resulting from oxidation, more or less great, of the negative plates. The average rate of working E.M.F. is probably 1·9 to 2 volts.

The internal resistance of De Kabath's cell is very small, viz., 0·05 ohm.

*Chemical Reactions.*—Considerable difference of opinion has existed amongst chemists and physicists as to the chemical changes that occur during the charging and discharging of accumulators; some believing that much of the storage effect depends upon the occlusion of oxygen and hydrogen gases by the positive and negative plates or by the active material thereon; some contend that lead sulphate plays an important part, whilst others assert that no chemical change of this sulphate occurs either in the charging or discharging of the plates.

Professor E. Frankland, F.R.S., made a series of experiments to test these various opinions, and the conclusions he came to were embraced in a paper which he read before the Royal Society in February, 1883, and which, stated briefly, were as follows. During the *charging* of the storage cell the chief chemical changes occurring appear to be the following:—

1st. The electrolysis of hexabasic sulphuric acid.

2nd. The reconversion of sulphuric anhydride into sulphuric acid.

3rd. The chemical action on the coating of the + plate—

$$\underset{\text{Lead Sulphate}}{SO_4\,Pb} + O + 3\,H_2O = \underset{\text{Lead Peroxide}}{Pb\,O_2} + \underset{\text{Hexabasic Sulphuric Acid}}{SO_6\,H_6}$$

4th. The chemical action on the coating of the negative plate—

$$\underset{\text{Lead Sulphate}}{SO_4\,Pb} + H_2 + 2\,H_2O = Pb + \underset{\text{Hexabasic Sulphuric Acid}}{SO_6\,H_6}$$

The initial action in the charging of a storage cell is the electrolysis of hexabasic sulphuric acid, each molecule of which throws upon the positive plate three atoms of oxygen, and upon the negative plate six atoms or three molecules of hydrogen. Each atom of oxygen decomposes one molecule of lead sulphate on the positive plate, producing one molecule of lead peroxide and one of sulphuric anhydride, the latter instantly uniting with three molecules of water to form hexabasic sulphuric acid.

The chemical changes which occur during the *discharge* of a storage cell are as follows:—

1st. The electrolysis of hexabasic sulphuric acid as in charging.

2nd. The reconversion of sulphuric anhydride into hexabasic sulphuric acid.

3rd. The chemical action upon the coating of what was before the positive plate or electrode, but which now becomes the negative plate of the cell; that is to say, the plate from which the positive current issues to the external circuit:—

$$\underset{\text{Lead Peroxid}}{PbO_2} + H_2 = \underset{\text{Lead Oxide}}{PbO} + \underset{\text{Water}}{H_2O}$$

The lead oxide thus formed is immediately converted into lead sulphate:—

$$PbO + SO_6H_6 = SO_4Pb + 3H_2O$$

4th The chemical action upon the coating of what has now become the positive plate of the cell:—

$$Pb + O + SO_6H_6 = SO_4\,Pb + 3H_2O$$

Thus in discharging, as in charging, a storage cell, the initial action is the electrolysis of hexabasic sulphuric acid. The oxygen eliminated on the positive plate reconverts the reduced metal of that plate into lead oxide, whilst the hydrogen transforms the lead peroxide on the negative plate into the same oxide, which in both cases is immediately converted into lead sulphate by the surrounding sulphuric acid, thus restoring both plates to their original condition before the charging began.

*Applications and Cost.*—The accumulator may be considered a very useful if not an indispensable auxiliary to the distribution of electricity in private houses, as a reservoir in its applications to lighting, electric motors, &c., but, from a commercial point of view, the question of cost comes upon the scene to darken the otherwise promising aspect, for it is evident that an agent, which has been produced and then stored, must cost more when redelivered than when first produced, by exactly the cost of the storage, provided there is no loss in storing. But there is a loss, and this, according to the experiments at the Conservatoire in Paris, is about 50 per cent. of the energy, as compared with direct working. Add to this the first cost of the accumulators, the expense of charging them, their low efficiency, and their bulk and weight, and there is enough to prevent them competing successfully with the direct use of the dynamo-electric machine. For special purposes, however, the accumulator has its advantages, amongst which may be mentioned its transportability, for by placing it near the work to be done, the loss of energy on long conductors is obviated. It may be used as a regulator, and by its action compensate any irregularities in the source of the current, such as variations in speed and power. Amongst other uses, it may be applied to the lighting up of railway trains, for experimental purposes, photography, working of breaks, propulsion of tricycles, boats, balloons, &c., and when sufficient advance has been made in the design and construction of accumulators, and their employment can be shown to be commercially practicable, electric lighting, especially for ordinary domestic purposes, will receive a great impetus.

General or Concluding Remarks upon Batteries.—The question is frequently asked, Which is the best battery? To this it is impossible to give a definite reply, since each form has its special qualities which adapt it to particular purposes; therefore, the work for which it is required must be considered, and the selection made accordingly. It frequently happens that cells are used which are too small for the work required of them. A small cell will not work regularly, because the liquid rapidly changes its nature. In double liquid cells, care must be taken to so proportion their size as to contain the relative quantities of the two liquids required for the work to be done, so that neither is wasted. When the plates differ in size, the question arises as to which shall be the largest? In reply to this there are two good reasons why the negative metals should be the largest. Firstly, the zinc is subject to *local action*, or waste, which contributes nothing to the work, and therefore its size should be reduced to just that amount which is requisite to maintain the current required. Secondly, the negative plate is subject to *polarization*, and should, therefore, be as large as possible. In nearly every case the best arrangement of the elements is one in which the negative plate is a cylinder placed within the containing vessel, in the middle of which the zinc can be suspended. A good battery should possess great *capacity for work* and *constancy*. *Capacity for work* depends on the amount of active materials contained in the cells, to which is related *quantity* or *current;* and upon the amount of energy liberated by the equivalent action, on which depends the electromotive force. E.M.F. is gained by using cells of greater force or by connecting them up in *series*, that is + to –, + to –; but this also adds their resistances by the internal resistance of the added cells.

Internal resistance is reduced by using plates of large size, or by coupling cells together + to +, and – to –, and then to the circuit, so as to act as one cell. Cells of a different character or "make up" should never be coupled in this manner.

*Porous jars* vary considerably in quality, and their selection should depend upon the special purpose for which they are intended; for long-sustained action, as in the Leclanché, a thick and close-grained jar must be used; while for short periods and strong action a more porous one is most suitable. The red coloured jar of soft material is the most porous; the finest and most durable are made of white close-grained earthenware. Their porosity may be tested by filling them up with water and noting the time it takes to pass through the cell and form a dew on the outer side. That part of the cell which is to remain above the liquid, also the bottom of the cell, should be rendered non-absorbent by standing in a thin layer of melted paraffin until sufficient has been soaked up.

*Suitability of Cells :—*

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| 29. Leclanché's... ... ... ... ... | 1·42 | ,, | 21 |
| 30. Niaudet's ... ... ... ... ... | 1·65 | ,, | 22 |
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*Large Currents.—Continuous.*

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| Electro-deposition. Nos. (as arranged above) | | 11, 21, 28, 37, 40. |
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*Temporary.*

| | |
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| Induction Coils ... ... ... ... ... ... ... ... | Nos. 26, 25, 21. |
| Medical Coils ... ... ... ... ... ... ... ... | „ 26, 41, 42, 43, 44, 48, 21, 27. |
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*Small Currents and High Resistance.*

| | |
|---|---|
| General Telegraphs ... ... ... ... ... ... | Nos. 11, 29, 21, 51, 41, 34. |

*Occasional.*

| | |
|---|---|
| Domestic Bells and Telegraphs ... ... ... | Nos. 41, 29, 49, 13, 37. |
| Exploding Fuses ... ... ... ... ... ... ... | „ 51, 29, 41. |
| Testing Resistances, &c. ... ... ... ... ... ... | „ 26, 25, 41, 29, 42. |
| Experimental ... ... ... ... ... ... ... ... | „ 13, 12, 31, 40. |
| Galvano-Cautery ... ... ... ... ... ... ... | „ 26, 22, 50, 46, 45. |

## THE TEETH OF THE OX.

BY F. WELLAUER.

FOLLOWING upon the valuable paper, " Dentition as Indicative of the Age of the Animals of the Farm," by Professor T. G. Brown, published in this and the preceding volumes of the *Dental Record*, some extracts translated from the pamphlet by F. Wellauer,* will not be without interest. We are indebted to Mr. G. Poulson, of Hamburg, for sending us the brochure.

The formula for the lower jaw of the ox is:—

$$\begin{array}{lcccc} \text{Permanent teeth} & \dfrac{i}{4} & \dfrac{c}{0} & \dfrac{pm}{3} & \dfrac{m}{3} \\[2ex] \text{Temporary teeth} & \dfrac{i}{4} & \dfrac{c}{0} & \dfrac{pm}{2} & \dfrac{m}{1} \end{array}$$

As to the fourth incisor, I cannot make up my mind to call it a canine, because it has a slight resemblance to the latter; whereas all its characters are those of an incisor, I shall describe it as such. Mr. Charles Tomes, in his " Dental Anatomy," says:—" I have retained the usual dental formula, $i\,\frac{0}{3}\;c\,\frac{0}{1}$; though under protest, as I do not consider the 'canine' to have any such distinct existence as would justify our calling a tooth which is so obviously referrable to the incisors by any distinctive name."

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* Die Zähne des Rindes und Deren Substanzen! von F. Wellauer. Frauenfeld Commissionsverlag von J. Huber. 1883.

If I were obliged to state which of the premolars of the ox are missing, keeping in view the typical mammalian dentition, I should say the second one, because the difference between the first and second is so striking that I believe a tooth has been lost from between them—this would correspond with the second premolar of the typical number.

The predecessor of the third premolar is hardly to be called a milk premolar ; it should be called a milk molar, its form and shape being like those of the third molar.

Having described in considerable detail the forms of the several teeth, the author proceeds to consider the structure of their tissues. He finds that the cementum of the crown is not only penetrated with a few large tubes, but with innumerable small tubes and branches which come from the principal canal and end towards the enamel. In the cementum of the root the canals are very numerous and often communicate with the tubes of the dentine.

The structure of the dentine of the teeth of the ox is compared with that of human dentine, and the difference is shown in two lithographic drawings. At the surface of the dentine, in the crown as well as in the root, the author describes a layer resembling the "granular layer" of Tomes; but it does not resemble the globular substance in the crown of human teeth. He finds this layer constantly present even in most perfectly formed teeth ; and this leads him to doubt its being an imperfectly developed tissue. Has not this particular formation some purpose ? Does it not take some part in a kind of sap-circulation between the dentinal tubes and the super-imposed tissue ? Are there not here some nerve terminations ?

The enamel of the ox is distinguished from human enamel by being less solid and not so much calcified. The enamel prisms cross one another very freely ; and in sections of molar teeth the author notices a third direction pursued by the prisms which is parallel with the surface. At no point has he observed the prisms passing either into the dentine or into the cementum.

In the deep pits opening upon the grinding surface of the molar teeth, the author describes the cemental substance situate therein as osteo-cementum. Some writers have called this a product of the saliva, but its organised structure at once proves the erroneous nature of that statement. The term "osteo-cement" was chosen because of its resemblance with bone as well as with cementum. It is permeated with Haversian systems, but is imperfectly calcified. In the developing tooth it has a brown appearance, and this colour is intensified in the fully grown tooth.

The brochure is illustrated with four sheets of lithographic drawings, each containing numerous figures.

## IMPACTION OF ARTIFICIAL TEETH IN PHARYNX.

By W. S. Church, M.D.

*(From St. Bartholomew's Hospital Reports, Vol. XIX.)*

*(Continued from p.* 451*).*

### I.

### CASES WHERE FOREIGN BODIES HAVE BEEN IMPACTED FOR LENGTHENED PERIODS IN THE PHARYNX OR ŒSOPHAGUS WITHOUT LEADING TO SERIOUS INJURY OF THE ŒSOPHAGUS OR NEIGHBOURING PARTS.*

#### Case I.†—*Sir James Paget's Case.*‡

A gentleman, 60 years of age, swallowed his false teeth, and they became impacted in the pharynx, and remained there four months. His recovery on their removal was rapid and complete.

#### Case II.†—*Mr. J. Blackstone and Mr. G. Pollock's Case.*§

A lady, aged 33, in attempting to swallow a pill, swallowed a small gold plate with two teeth attached; it became impacted in the œsophagus low down, and gave much pain, referred to a spot in the median line corresponding to the lower end of the œsophagus. After nineteen days Mr. Pollock passed an œsophagus tube. When more than half-way down and near the cardiac orifice, the extremity of the instrument came in contact with some solid resisting body; with very slight continued pressure the latter appeared to be almost immediately dislodged, and the end of the tube passed into the stomach. The patient immediately expressed herself relieved from the pain, and was able to swallow solids and liquids without difficulty. Ninety-seven days afterwards, in attempting to take two pills, she vomited and brought up a quantity of fluid from the stomach, and the plate and teeth along with it.

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* The cases marked † have been already collected and published by Mr. Weiss in the *Odontological Society's Transactions*, vol. ix.

‡ *Medical Times and Gazette*, January 18, 1862.

§ *Lancet*, April 3, 1869.

### Case III.—*Dr. Barling's Case.** *False Teeth Impacted in the Pharynx for a Month.*

Dr. Barling showed, at a meeting of the Birmingham and Midland Counties' branch of the British Medical Association, a gold plate with two teeth attached, which had remained a month at the back of the larynx, encircling the thyroid cartilage. Exploration of the pharynx and œsophagus had at first failed to discover it, but on pain being referred to the region mentioned, it was found and extracted.

### Case IV.—*Mr. Edward Williams' Case.*‡ *A Halfpenny Impacted in the Œsophagus for* 181 *Days.*

On August 12, 1879, a child was brought to Mr. Williams' surgery, having just before swallowed a halfpenny. Mr. Williams' *locum tenens* failed to find any evidence of its presence in the gullet, and, as there were no urgent symptoms, left matters alone. After some months the child was unable to swallow anything solid or to lie down in bed at night, and complained of pain to the left of the ensiform cartilage. On the 9th of February, 1880, 181 days afterwards, Mr. Williams passed a double probang, which brought the missing coin into the mouth.

### Case V.—*Mr. Hugh Thomas's Case.*§ *A Halfpenny Impacted in the Œsophagus for Twenty-eight Days.*

A lad, aged 12, playing with a halfpenny on September 1, 1877, swallowed it. Twenty-eight days after, he was taken to the Queen's Hospital, Birmingham, having difficulty in swallowing, loss of flesh, and fixed pain at the lower portion of the sternum. A double probang was introduced; about the lower third of the œsophagus a resistance was met with, but the probang passed on to the stomach. It was then expanded and slowly withdrawn, bringing up the coin in its meshes. Four days later he could eat and drink without difficulty and "felt quite well."

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* *British Medical Journal*, April 30, 1881.

‡ *Lancet*, February 14, 1880.

§ *British Medical Journal*, December, 1879.

### CASE VI.—*Dr. Ogier Ward's Case.**

This case is quoted by Mr. Durham in his article on foreign bodies in the pharynx in Holmes's "System of Surgery," vol. ii. A child one year and eight months of age swallowed a halfpenny. Stridulous breathing and difficulty in swallowing came on immediately after the accident. The child, which was still at the breast, could only suck one mouthful of milk at a time, and was obliged to withdraw from the breast at each attempt to swallow. Eight months elapsed, when, after a severe fit of coughing, the child took the halfpenny from out of its mouth and gave it to his father. The child gradually recovered.

### CASE VII.

is in some respects most remarkable, and is, so far as I know, quite unique. A young man, aged 19, on March 13, 1876, swallowed a shawl-pin, head first. A single cough removed all the momentary discomfort produced, but he sought advice at St. George's Hospital as soon as possible. Nothing was discovered then in his throat. For a fortnight he examined his motions daily, but saw no trace of the pin. From this time he forgot all about the mishap until the reappearance of the pin itself, eleven months after, recalled it to mind. A week after the accident he commenced to feel a slight pricking sensation on the right side of the neck about the situation of the cricoid cartilage. This was intermittent, being once absent for a month, and was accompanied by a constant, harsh, dry cough, occasionally aggravated in paroxysms lasting from a quarter to half an hour, only sometimes followed by a little blood-streaked expectoration. Both the cough and pricking sensation were aggravated by the recumbent position. There was no difficulty nor pain in breathing or swallowing at any time, nor any alteration in voice.

On November 11, 1876, the man attended as an out-patient at St. George's Hospital, and the notes then taken show that he complained of a pain felt only near the right clavicle, and that it hurt him when he coughed. He had slight bronchitis. He was not much benefited by treatment, which continued for three weeks.

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* *Pathological Society's Transactions*, 1848-49.

During this time he made no mention of having swallowed a pin, nor on January 17, 1877, when he again presented himself at the Out-patient Department of the hospital with the same complaints, cough and pricking feeling on the right side of the neck, both worse on lying down.

Three weeks before this he had noticed a lump forming in the right side of the neck near the cricoid cartilage. Now there was a diffused painful swelling, extending from the angle of the jaw almost to the root of the neck. There was no fluctuation and some redness of the skin. Nothing wrong was detected in the chest. There was slight congestion of the fauces. The cough continued unabated, but the swelling of the neck gradually subsided, and in a fortnight from the commencement of his attendance was not noticeable.

While at work on February 8, 1877, he suddenly coughed up the pin, first the head with part of the shaft attached, and an hour afterwards the rest of the shaft. He did not expectorate anything with either piece. The head of the pin is of the size of a boot button, made of glass; three-quarters of an inch of the shaft is still attached to it: this has been eaten away to a point, and is covered with blood and rust, except the quarter of an inch next the head, which has escaped with almost no corrosion. The other piece of the shank, an inch and a half in length, tapering at either end, is entirely covered with the same rusty coating.

On February 9, the day after the pin had been coughed up, the patient continued to have a slight cough and pricking in the throat. The lungs and the throat, as far as could be ascertained without the use of a laryngoscope, were natural. The swelling of the neck had entirely disappeared. A week after he had no cough to speak of, and his throat felt quite comfortable.*

It is hard to reconcile the statement that after the first fortnight he forgot all about the mishap with the continuity of the symptoms, especially the pricking in the throat. It seems to me more probable that, for some reason or other—probably from fear of being disbelieved—he was unwilling to mention the subject. Mr. Dunbar, by whom the case was brought before the Pathological Society, was of opinion that the pin was lodged in the right glosso-epiglottic fold, and for his reasons I would refer any one interested in the subject to his remarks in the *Pathological Society's Transactions.*

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* *Pathological Society's Transactions*, vol. xxviii. p. 120.

It is not always, however, that the sufferers escape so easily. In some instances, removal of the impacted body has not immediately relieved the patient from all his troubles ; and in others, retention of the impacted body has led to fatal results. As examples I may quote the following :—

## II.

## CASES IN WHICH IMMEDIATE RELIEF HAS NOT FOLLOWED THE REMOVAL OF FOREIGN BODIES FROM THE ŒSOPHAGUS, AND CASES OF DEATH ARISING FROM THEIR PRESENCE THERE.

### CASE I.†—*Dr. Geoghan's Case.**

A gentleman, aged 60, swallowed a vulcanite plate with five teeth, which remained impacted in the pharynx for five months. After their removal the chief symptoms were removed, but for twelve months after removal uneasiness was felt at the side of the neck, and solid food had to be washed down by a mouthful of fluid.

### CASE II.—*Mr. Nicholl Evans and Mr. T. Smith's Case.*‡ *Impaction of a Gold Plate and False Teeth in the Œsophagus for upwards of Two Years.*

A young lady, aged 21, an invalid for many years, swallowed her teeth while taking a pill on April 26, 1877. On passing a probang, the impacted teeth could be felt 8½ inches from the lower incisor teeth. Later in the day Mr. Smith failed to dislodge them, and again on the 29th. Neither the patient nor her friends would permit further operative measures, and she remained for two years in a most miserable condition, though not apparently suffering very much pain in the œsophagus. How far her condition may have been due to the impacted plate it is impossible to conjecture, as she apparently was the victim of hysteria in its most aggravated form. Two years and eight days after their impaction the false teeth were vomited. Fifty-one days after their reappearance there was no improvement in the patient's general condition, and as much difficulty in deglutition as whilst the teeth were impacted.

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* *Medical Press and Circular,* March 14, 1866.

‡ *Lancet,* July 19, 1879.

### CASE III.—*Mr. Armstrong's Case.** *A Halfpenny Impacted in the Œsophagus, and Causing Death after Two Years.*

On October 22, 1856, a child was brought to the surgery. He had been seized with vomiting of blood half-an-hour before while at play. In the surgery he brought up about half-a-pint of coagulated blood, and with it a halfpenny. The boy vomited again in the course of the night and died.

Two years and three months previously he had swallowed a halfpenny, and ever since had frequently vomited his food and had a difficulty in swallowing meat.

At the post-mortem, on passing the finger up the œsophagus from the stomach, it was grasped rather tightly a little below the arch of the aorta. On slitting the œsophagus open above the constriction, two ulcerated points were seen on opposite sides in its mucous lining. The ulcer on the left had perforated the aorta by a small opening below and opposite to the origin of the left subclavian. About half-an-inch of cicatrix appeared above each ulcer, marking the downward course and progress of the coin in the two years and a quarter it had remained suspended in the gullet. Whether the contraction below had been congenital or acquired after the sticking of the halfpenny is a question "not easily decided. My impression is, that this constriction had existed from birth, and it had checked the further descent of the coin."

### CASE IV.—*Mr. C. Laurence Bradby's Case.* ‡

A prisoner in Pentonville prison, seven months after his reception, first stated that he had swallowed a bad half-crown some time previous to his conviction. To this he attributed his ailments, vague pain in the chest and dyspeptic symptoms. On September 24, for the first time, he vomited some blood and was removed to the infirmary. Two hours afterwards, while sitting up in bed to take some food, the hæmorrhage recurred, and a large quantity of blood was again vomited. He sank down in the bed and died.

In connection with these cases, I may mention a few other instances of fatal hæmorrhage arising from the retention of foreign bodies in the œsophagus. The first I saw many years ago in the practice of Mr. Wormald at the hospital. A sharp fish bone which stuck in the œsophagus had its point projecting for a considerable distance through the œsophagal wall, and gradually sawed a hole in the aorta, and occasioned death from hæmorrhage. I do not recollect whether in this case a probang had been passed previously to the man's entering the hospital, but I am almost sure that no operative measures at all were attempted in the hospital. A second very similar case, in which the pericardium and heart were wounded, has been published by Mr. Eve in the *Clinical Society's Transactions*.* He also refers to Mr. Wormald's case. A third and still more remarkable case is that communicated to the Pathological Society by Dr. Farquharson for Dr. Spry.‡ A trooper in the 2nd Life Guards, five days previously to his death, had pain in the chest, which he attributed to having eaten his dinner too quickly. A very small spiculum of bone, $\frac{1}{8}$ inch in length, had perforated the wall of the œsophagus and led to ulceration, which spread to the aorta, and caused ulceration of that vessel $1\frac{1}{4}$ inch below the origin of the *arteria innominata*. Across the ulcer a rent took place, and the man died suddenly, vomiting blood.

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* *British Medical Journal,* November 8, 1879.

‡ *Medical Times and Gazette,* October 17, 1868, p. 447, quoted by Mr. Durham.

Another very similar instance of death from hæmorrhage, consequent on ulceration caused by the presence of a fish-bone in the œsophagus, occurred in the London Hospital under the care of Dr. Ramskill; § and in the *Lancet*, August 25, 1860, is recorded the post-mortem examination of a woman brought in dead to the University College Hospital. A fish-bone had perforated the stomach close to the œsophagus, then the diaphragm and pericardium, and lastly the heart, puncturing the right coronary vein.‖

*(To be concluded).*

## HERBST'S NEW METHOD OF FILLING TEETH.

By Dr. W. D. Miller, Berlin, Germany.

The method of inserting gold fillings strenuously advocated by W. Herbst, of Bremen, during the last half decade, is sufficiently well known to the profession to render a detailed description unnecessary. This method is especially characterized by two features. The first of these is the extensive use of the matrix for approximal cavities, the second the employment of a rotating, smooth-pointed instrument for condensing the gold.

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* Vol. xiii. p. 174.

‡ Vol. xix. p. 219.

§ *Lancet*, May 17, 1871.

‖ Mr. Andrew's Case, quoted by Mr. Durham.

The operation may be best made clear by describing a case in practice. We have to fill the left upper bicuspids, both decayed on the approximal surfaces. The cavities are opened to the grinding surface and prepared as for inserting a cohesive foil filling, with exception of retaining points, which are never made. The matrix is now brought into place, and the point of a steel pin inserted between the matrix and first bicuspid from the buccal side, and if necessary from the lingual side also, so as to press the matrix tight against the surface of the second bicuspid at the neck; warmed shellac is now packed into the cavity of the first bicuspid, to hold the matrix firmly in position. After the cavity of the second bicuspid has been filled, the shellac and matrix are removed, a second higher (wider) matrix inserted and pressed, by the same means as before, tight against the surface of the first bicuspid, which is then ready for filling. Should the second bicuspid be wanting, then the matrix is held in position by filling the whole space between the first bicuspid and the first molar with shellac. The matrix being in position, three or four cylinders of Wolrab foil, No. 2, 3 or 4 (or an equivalent of Wolrab foil No. 4 made into pellets), are brought into the cavity just as they would be into a simple cavity on the grinding surface, and fixed into position by pressing tightly upon them with one of the larger burnishers of the set, slowly rotating. It is then condensed by a succession of strong taps or pressures of the rapidly rotating instrument No. 5.

(The surface of the instrument soon becomes coated with gold, which must be removed by pressing it while rotating upon a piece of pure tin.)

This is then followed up by an ordinary hand plugger, to ascertain whether the gold has been properly condensed at all points. The above process is repeated till the operation is completed, the surface of the gold at last being thoroughly condensed by means of one of the smooth polished instruments of the set.

In filling large cavities on the grinding surface, first two, three, or four cylinders of No. 1, 2 or 3 Wolrab foil are pressed against the bottom of the cavity with the pliers, and then with one of the *polished* instruments, *slowly* rotating, fixed in position; if it does not at once become firm, more gold is put in till it does; it is then condensed with No. 5, *rapidly* rotating, and this instrument is then used almost exclusively till the gold is all in; then No. 1-4 or 7 is used for condensing the surface.

Approximal cavities in the central incisors are treated as follows (previous separation by means of cotton having been secured): The cavities are prepared slightly broader at the bottom than at the opening; no retaining points are required. Two or three cylinders of No. 2 Woolrab foil are pressed into the first tooth towards the gums, likewise into the second tooth, and condensed with No. 5; this process being repeated till both cavities are overfilled, so that the gold in the two fillings appears to form one continuous mass.

Then No. 15 (a clean, fine needle), slowly rotating, is pressed through between the filling at different points, and the separation completed with a fine file. The fillings are then further condensed by Nos. 12-14, rapidly rotating, with interrupted pressure.

The advantages claimed for the Herbst method are: 1st. Rapidity of operation. This comes particularly into account in proximal fillings, which can be inserted in much less time than is required by either the hand or electric mallet.

2nd. The injuries frequently done to frail tooth structure, as well as to the pericementum by the use of heavy mallets, of course are entirely avoided.

3rd. The equally baneful necessity of weakening or sapping a tooth by large retaining points is also done away with.

4th. The operation is less disagreeable to the patient than that by the mallet method.

Perhaps the most valuable feature of any method is the ability to produce by it fillings which shall be perfectly adapted to the walls of the cavity, and in this respect the Herbst method seems to promise success.

A number of fillings made by Herbst, with the time occupied in the insertion of each, were sent to me with the request that I would give them a thorough examination. For this purpose I caused similar fillings to be inserted in the same time by the hand mallet and by Telchow's Pneumatic Mallet. The teeth were then immersed in an alcoholic solution of fuchsine and allowed to remain twenty-four hours; at the end of this time they were split, and it was found that Herbst's fillings had resisted the penetrating power of the liquid better than the others; *i.e.* they made better contact with the walls of the cavity than those inserted by the other methods. Herbst makes use of gold cylinders prepared by Wolrab in Bremen, a preparation which works, in the words of an old operator, "like mush."

How far his success is to be ascribed to the admirable qualities of the gold I do not know, nor is it possible to say how his fillings will stand the test of time.

This much, however, we may safely say, that his method has shown itself to be deserving of a thorough investigation, and it is particularly desirable that American operators should make themselves acquainted with it.—*Independent Practitioner.*

## GENERAL MEDICAL COUNCIL.

At a meeting of the Medical Council, on October 11th, Sir Henry Ackland, M.D., President, in the chair, the following petition, being a complaint against certain registered Dentists, was read:—

"*To the General Council of Medical Education and Registration of the United Kingdom.*

"SHEWETH—

"1. Your petitioners are duly registered Dentists and Dental Practitioners engaged in the practice of dentistry at Nottingham.

"2. The *Dentists' Register* for 1884 contains the names of Albert Eskell, Edward Emanuel Eskell, and Harry Louis Eskell, who are therein described as having been registered in October, 1878, and as having been in practice previously to July 22, 1878, the date of the passing and coming into operation of the Dentists' Act, 1878.

"3. The said Albert Eskell, who has recently, as we are informed and believe, retired from the active exercise of his profession, has for many years been engaged in the practice of dentistry with his two sons in London, under the style of A. Eskell & Sons. The said firm has a large and lucrative practice, and the name of Eskell has for many years been, and still is, well understood to denote a member of the said firm.

"4. The said *Dentists' Register* for 1884 also contains the names of Isidore Clifford, Abraham Clifford-Eskell, Ruby Clifford-Eskell,* Stanley Clifford-Eskell, and Walter Clifford-Eskell, who are therein described as having been registered in 1878, and as having been in practice previously to July 22, 1878.

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* [Ruby Clifford-Eskell now applies to the Registrar to have his name changed in the *Dentists' Register* to Ruby Eskell-Clifford.]

"5. All or some of the persons mentioned in the last preceding paragraph practise as Dentists or Dental Surgeons at No. 8, Grosvenor Street, London, where the names of A. Clifford, R. Clifford, and A. Clifford-Eskell alone appear on the brass plates affixed to the door of the premises.

"6. The entry in the said *Dentists' Register* referred to in the 4th paragraph hereof appears to have been incorrectly if not fraudulently made, inasmuch as not only are the persons who are registered therein as bearing the name of Clifford-Eskell known to the public and to their professional brethren as the Messrs. Clifford, but two at least of the said persons had, at a date prior to the publication of the said *Register*, executed deeds whereby their names had been changed from Clifford-Eskell to Clifford.

"7. Within the last two or three years certain members of the said firm of Messrs. Clifford have established branches in several provincial towns, such as Leicester, Northampton, Chelmsford, Colchester, and Nottingham. In each of those cases the name under which the branch practice has been, and is ostensibly carried on and advertised in the local press, is the name of Eskell, and in no case, so far as we are aware, has the name of Clifford been employed either alone or in connection with the name of Eskell.

"8. Two members of the said firm of Clifford have recently established a branch practice in Nottingham, where they have been and are now engaged in the practice of dentistry and dental surgery, under the style of 'Mr. Eskell, Surgeon-dentist,' upon premises to which they have given the description of 'Eskell Chambers.' No person of the name of Eskell is connected directly or indirectly with the practice carried on at the said Eskell Chambers. The practice is, in fact, conducted for the benefit of the said two members of the firm of Clifford in London, by one Frank Victor Vowles, a registered Dental Practitioner, who was formerly, and before he entered the service of Messrs. Clifford, an assistant to Messrs. A. Eskell & Sons, of London. The said Frank Victor Vowles passes under the name of Eskell, using sometimes the initial 'F. V.,' and calling himself 'F. V. Eskell,' and sometimes the initial 'A.,' which is the initial of the senior partner of the firm of A. Eskell & Sons.

"9. This user of the name of 'Eskell' is calculated to mislead, and there is evidence to show that it has in fact misled, persons desirous of consulting a Dentist or Dental Surgeon in Nottingham into supposing that the 'Mr. Eskell, Surgeon-dentist,' whose name appears on the brass plate affixed to the outside of the said Eskell Chambers, is one of the Eskells whose names are contained in the *Register of Dentists* of the United Kingdom.

"10. Representations and remonstrances have been repeatedly addressed to the Messrs. Clifford, with the view of inducing them to discontinue the use of the name of Eskell in connection with their provincial practice, but without any effect. The Messrs. Clifford decline to make any change or to depart in the slightest particular from a course of conduct which has been adopted with results so satisfactory to themselves in a pecuniary point of view.

"11. Your petitioners respectfully submit that, assuming the several allegations hereinbefore made to be capable of being established by legal proof, as they are advised and believe can be done, the Messrs. Clifford have been guilty of 'disgraceful conduct in a professional respect' within the meaning of the 13th section of the Act 41 and 42 Vict., cap. 33 (the Dentists' Act, 1878), and have thereby rendered themselves liable to the consequence (pointed out in the said section) of having their names erased from the *Dentists' Register*.

"Your petitioners therefore humbly pray your Honourable Body:

"That you may see fit, under the above circumstances, to cause inquiry to be made by a Committee of the said General Council, under the 15th section of the said Act, with all powers necessary to ascertain the facts of the case, and report thereon to the said General Council.

"And your petitioners will ever pray, &c.

"DUNCAN STUART HEPBURN, L.D.S. Eng.
"WALTER BROWNE, L.D.S.I.
"WILLIAM GODDARD, L.D.S. Eng.
"GOODMAN L. BELLABY, L.D.S. Eng.
"FREDERICK BELLABY, M.R.C.S., L.S.A., L.D.S. Eng.
"WILLIAM HENRY CHALCRAFT, L.D.S. Eng.
"HENRY BLANDY, L.D.S.I., F.P. & S. Glas. and L.D.S. Edin."

After some discussion, it was moved by Dr. Quain, and seconded by Dr. Aquilla Smith, and resolved—"That the Council sees no reason to take any action in this matter."

## JOURNALISTIC SUMMARY.

### DENTAL COSMOS. (*October, NEW YORK.*)

"DENTO-EMBRYONAL HISTOLOGY AND TECHNOLOGY," by Dr. Xavier Sudduth. This was the subject of an article read before the Illinois State Dental Society in May last. For the demonstration of the development of human teeth, the author has found the fœtus of pigs most readily obtained in good condition. For sections of fully developed teeth, young kittens or rabbits are best adapted. He recommends, as a hardening fluid, a one per cent. solution of chromic acid, the portions of jaw to be suspended in the fluid by means of a string. He then mentions some different modes of embedding the pieces, as in hardened hog's liver, mucillage, and celloidin; and the means of cutting and mounting sections, staining, &c. The article is to be continued.

"DIFFERENTIAL DIAGNOSIS," by Dr. Charles J. Essig. Having related several rather complicated cases of pain in connection with the teeth, and the means of diagnosis adopted, the importance of accurately ascertaining the cause and exact seat of the trouble is emphasised by reference to certain serious cases. Dr. Essig believes that in the famous Gardner case the patient died of pyæmia resulting from an unusually large alveolar abscess; and if this had been correctly diagnosed and treated in its incipiency, the patient's life would have been saved. Also, four or five years ago, a suit for malpractice was instituted against a most worthy and conscientious young member of the profession, whose only fault was in failing to differentiate between periostitis and an exposed pulp. The patient, in the absence of proper treatment, suffered a severe alveolar abscess, necrosis of the process, and the loss of several neighbouring teeth; and it was all his friends could do to save the young gentleman from being mulcted in heavy damages.

"OPERATIVE DENTISTRY: General Principles and Special Points," by Dr. A. G. Bennett. It is not possible in all positions to divide the enamel between the rods; but the walls should be so bevelled as to conform as nearly as possible to their directions. It is sufficiently accurate for our purpose to state that the enamel columns lean towards a small and from a large crown cavity, and that, on any other surface of the tooth, the larger the cavity the more the rods diverge; so that, if the cavity wall be bevelled almost to the thickness of the enamel and at an angle of from twenty-five to thirty-five degrees, according to the size of the cavity, we shall conform as nearly as it is usually possible to the line of cleavage. All operators have doubtless observed that the softer and more brittle the enamel, the more readily it divides; and it may be added that the greater is the necessity for conforming to the directions of the rods. I think all close observers will agree that the chief cause for the broken-down conditions of enamel walls around fillings is the neglect of this important point in preparing cavities.

Enamel is best divided with the chisel, which must be sharp and used carefully, or the rods will be crushed or broken. When cleavage is not available, the final cutting, at least, should be done in the smaller cavities with sharp burs, and in the larger cavities with corundum points. The enamel, as well as the dentine, along the cervical wall not being brittle nor accessible to burs, is best removed with an excavator, of which I will speak again. All accessible enamel walls should be polished with emery tape or fine corundum points. Other things being equal, a polished surface will give the closest possible joint between the filling and tooth-structure.

The dentine must contain the anchorage for fillings. The general and, I may observe, the correct practice is to groove the dentine near the enamel. As a groove interferes somewhat with the nutrition of the tooth, and often produces discoloration around fillings, it should be as shallow as is consistent with retention of the filling. By using one or two pits a little deeper than the groove to start in, the minimum of shallowness can best be attained. Although a groove is a necessary evil, it has, according to some experiments of mine, at least one compensating property—when properly made and solidly filled, the gold is more or less wedged into it, thereby producing a joint as nearly perfect as can be made, and giving the dentine the best possible protection against external moisture.

Gold becomes harsh and obstinate under too much heating and hammering. In trying to account for its tendency to draw away from the cavity walls, it is strange that someone has not struck the idea that between a live-blow mallet and elastic tooth-bone such a tendency might be expected to appear. Yet it seems to me that a light dead-blow mallet gives the best results.

It has been said that gold will spread only under a smooth convex surface,—a surface that, besides being favourable to slipping, does not give us the full benefit of the cohesive property. But I think it can easily be demonstrated that gold will spread slightly under a convex surface that is serrated transversely; but if serrated in both directions the spreading is more or less problematical. In my opinion, the best surface for all mallet pluggers, especially those of the foot-shape, is not one of extreme convexity or flatness, but slightly convex, of oval shape, and with fine or medium serrations.

Contour derives one of its strongest points from separation, while the worst evils of separation are prevented by contour. Separation removes defective enamel and often exposes the dentine, which may or may not be protected by filling; contour, after removing defective enamel and dentine, replaces the tissues by a metallic approximal surface. This metallic surface, if properly formed, is practically indestructible. The weakest part of these fillings (approximal surfaces of bicuspids and molars) as every Dentist knows, is along the cervical wall.

I have devised, or, to be more exact, modified an excavator for cutting the cervical wall—an excavator, I may observe, that only needs to be tried to have its merits appear. The angle, size, thickness, and edge of the blade admit of the smoothest and most effective cutting in the smallest possible space, without passing into the cavity or slipping off against the gum. This instrument is a modified spoon excavator, the blade being made thinner and the sides and edge square. By changing the angle of the edge the same instrument can be used to bevel the enamel margin. If this wall is thus prepared and covered with tin, soft gold, or amalgam,—the last being the only reliable material for deep cavities,—and the filling is smoothly finished, we have complied as far as it is possible with the conditions of success in this most difficult and vulnerable point of all fillings.

**INDEPENDENT PRACTITIONER.** *(October, NEW YORK.)*

"HERBST'S METHOD OF FILLING TEETH," by Dr. W. D. Miller. This article is reproduced on page 511.

"A VISIT TO THE DENTIST," by One who has been there, is a humorous story, occupying eight pages.

"AMALGAM," by Dr. S. C. G. Watkins. The insertion of large gold fillings in molars is so wearing upon both patient and operator, and so expensive, that the patient is completely disheartened, and refrains from visiting the Dentist again for several years; the result being that there is a positive loss to both patient and operator. Amalgam would be much better in such cases.

The writer says there is a class of cavities which I particularly wish to call attention to: viz., posterior approximal cavities in the molars, or where a posterior and an anterior approximal come in close contact. In such cases most amalgam fillings are failures, not because of any fault in the amalgam or any fault in the tooth structure, but on account of gross carelessness on the part of the operator. In all cases of approximal fillings, whether of gold, amalgam, oxy-phosphate, or gutta percha, the rubber-dam should be placed upon the teeth, the cavity properly prepared with under-cuts from all sides where there is sufficient tooth substance to warrant it, and the periphery thoroughly trimmed and rounded, so that there will be no frail edges, especially cervical-approximal. Then the cavity should be washed out with either an antiseptic or an embalmer. In large cavities it is sometimes well to more than half or two-thirds fill with oxy-phosphate or oxy-chloride of zinc, allowing the filling to extend cone-shaped in the centre, leaving space for the amalgam to be placed upon the top of it.

Some claim that they can fill such places properly without the dam, and finish up the surface perfectly with silk floss drawn back and forth over the filling and under the edge of the gum, thus removing all excess of material. This I claim to be impossible if the amalgam has been properly condensed. Many cases that have fallen under my eye are found to be filled too full, the amalgam projecting beyond the edges of the cavity, in some cases the filling extending beyond the cervical wall an eighth of an inch, sending out ragged edges from all sides excepting the grinding surface. I have a number of such fillings in my possession which were inserted by some of the good men in our profession, and some by those not so promising. After turning out such work, is it any wonder that amalgam is thus denounced, and all praise and glory given to gold?

Again, I find amalgam an excellent material to partially fill a cavity in the posterior surface of the bicuspids or molars, and then cover with gold. I place a very thin band of copper around the tooth and ligate it well with floss; it being very soft, the floss will draw it close around the neck of the tooth. If the tooth is so shaped that the copper will not give to it, you can burnish it down to the cervical edge so as to get a perfect contour. Mix the amalgam very dry, and pack so as to condense thoroughly, until the cavity is about three-quarters full; then cut away the filling until it is about one-half full, and finish with gold. The first few pieces will be embedded in the amalgam, and you can build from that and form your contour perfectly. When the copper matrix is removed you will find very little trimming to be done, and in my opinion it will be a better filling in that position than if it were all gold.

"A WANDERING SUPERNUMERARY TOOTH," by Dr. E. S. Talbot. This is an account of a case in which a supernumerary tooth was found perforating the floor of the nose at a point four centimetres back from the nostril. It was removed through the nostril by means of a snare. The portion of the root which was exposed in the nasal cavity had been the seat of abscess which had led to some necrosis of the palate bone.

## NEW INVENTIONS.

### LEMAN'S SUCTION VALVE.

MR. LEMAN'S Patent Dental Suction Valve is represented "as being the most simple, efficacious, and reliable valve ever yet offered to the Dental Profession." It is small and neat, and has the special advantage of the easy renewal of the disc when necessary. This can be done by the patient. The valve can be fixed in vulcanite, celluloid, or metal dentures. An illustration of it will be found in the advertising pages.

### DR. STOKES' CLAMP.

A NEW form of clamp has been introduced by Dr. Charles Henry Stokes. The blades of the clamp are extended, at the end farthest from the bowl, into flat semi-lunar discs, which are intended to keep the rubber or napkin from the line of vision. In the advertising pages will be found a wood-cut, which clearly represents the character of this clamp.

## OBITUARY.

THE death of Mr. Thomas Sheffield took place in Church on October 13th. The deceased was 80 years of age, and was the eldest son of the late Mr. Thomas Sheffield, Dentist, of Carlisle.

On the 15th ult., Charles Malcolm Ely, of Holloway.

The announcement of the death of Mrs. Rutterford, of Poland Street, will be received with regret. The deceased was known to many practitioners in connection with the business of the depot; and she died on the 11th ult., an operation having been performed a few days previously.

The Dental Manufacturing Company have lost their representative at the Manchester depot—Richard Adolphus Howell,—who died on the 16th ult., at the age of 40 years. The deceased ha left a wife and three children. The cause of his death was acute pneumonia, of four days' duration. Mr. Howell had been assistant and traveller with Messrs. Ash & Sons for about fourteen years, and he had up to the time of his death been about eight years with the Dental Company.

## EXAMINATION QUESTIONS.

### ROYAL COLLEGE OF SURGEONS OF ENGLAND.

The following written questions were given at the Examination on the 27th ult. for the License in Dental Surgery of the Royal College of Surgeons of England:—

#### ANATOMY AND PHYSIOLOGY.

1. Describe the origin, course, distribution, and function of the Inferior Maxillary Nerve.

2. Describe the Soft Palate and its muscles, and explain the act of Deglutition.

#### SURGERY AND PATHOLOGY.

1. Describe a case of Cancrum Oris and its treatment.

2. Give the causes, diagnosis, and appropriate treatment of Trismus.

#### DENTAL ANATOMY AND PHYSIOLOGY.

1. Describe the Dentition of the Pig, noting its adaptation to the creature's habits.

2. Describe the processes by which the temporary Teeth are shed, and their successors established. What are the usual dates of eruption of the several permanent teeth, and how far may they vary in healthy subjects?

3. Describe the specimens A, B, and C.

### DENTAL SURGERY AND PATHOLOGY.

1. Give instances of Reflex Irritation due to diseased teeth.

2. What is Pyorrhœa alveolaris? How would you treat it? What part does Tartar play in the disease?

3. What should be the characteristics of a theoretically perfect filling material? Enumerate the agents at present in use, and point out their several defects.

## CORRESPONDENCE.

[*We do not hold ourselves responsible for the views expressed by Correspondents.*]

### THE ADVERTISING L.D.S.

*To the Editor of* THE DENTAL RECORD.

SIR,—The observations made in the last paragraph of your Editorial Article of last month were most opportune. The "breach of promise" committed by too many of the Licentiates of Dental Surgery is appaling. The number that advertise in an unprofessional manner, and thus bring disgrace upon their College, is not so small as could be wished. I hope your observations will awaken the Royal College of Surgeons in Ireland, and other corporate bodies who grant Dental Degrees, to the desirability of protecting their honour, and especially that of their Dental Licentiates, from such violations.—Yours, &c.,

L.D.S.

THE Annual Dinner of the Past and Present Students of the Dental Hospital of London, will be held on Saturday, November 29th, at St. James' Hall, Regent Street, when the chair will be taken by Alfred Hill, Esq. Gentlemen, either now or formerly connected with the Hospital or Medical School, who may through inadvertence not have received special notice, and who desire to be present, are requested to communicate with the Dean at the Hospital.

LICENTIATES in Dental Surgery, who desire their names to appear in the *Medical Directory* for 1885, should at once communicate with the Editor of that work, at 11, New Burlington Street, W. The usual annual circular has already been issued.

# Editorial.

## THE PRELIMINARY EXAMINATION.

HITHERTO the registration of Students by the Medical Council has not been carried on in the same manner in the three sections of the United Kingdom. A candidate might pass one of the Scotch Preliminary Examinations in different parts, and at more than one time, and, having received his complete certificate, be registered as a Student by the Scottish branch of the Medical Council. On the other hand, the English branch Council would not register any examination, the several subjects of which were not passed at one and the same time. The absurdity of this anomalous state of affairs recently came under our notice. A candidate had passed in two parts the Preliminary Examination of the Royal College of Surgeons of Edinburgh, and applied to the General Registrar, in London, to be registered as a Dental Student. That could not be done, owing to the regulations of the English Branch Council, or Executive Committee. Then he could not be registered in Edinburgh, because the registration of Dentists and Dental Students is carried on only at the office of the General Medical Council in London. He could have been registered by the Scottish Branch Council as a Medical Student, but not as a Dental Student. The case was referred to the Royal College of Surgeons of Edinburgh, whose examination the candidate had passed, and, after some negotiation, he was ultimately registered as a Dental Student by the General Registrar.

This awkward difference between the regulations has just been amended.

At the meeting of the General Medical Council on the 16th ult., it was resolved—"That the subjects of the Preliminary Examination for Medical Students be allowed to be passed at one or more examinations." The conditions of examination and registration of Medical and of Dental Students has thus been equalised. What applies to one section of the kingdom should also be recognised in each of the other sections. This equality will henceforth attain with regard to the Preliminary Examinations.

This and other amended regulations will come into force on the 1st of October, 1885.

## GOSSIP.

Mr. I. Prager, L.D.S.I., has been appointed House Surgeon to the National Dental Hospital, and Mr. F. Wright has succeeded Mr. Prager as Assistant House Surgeon.

Mr. Henry J. Moxon, L.D.S.I., has been appointed Dental Surgeon to the London Female Penitentiary.

The office of Demonstrator in Clinical Dentistry at the College of Dental Surgery of the University of Michigan is held by Margaret Humphreys, D.D.S.

At the recent session of the General Medical Council the only "dental business" was a question of personation at Nottingham. Practically nothing was done in the matter.

It is gratifying to know that the Royal College of Surgeons of Edinburgh has unanimously re-elected John Smith, M.D., LL.D., &c., president for the ensuing year. Dr. Smith is also president of the British Dental Association.

That light of some kind, and in considerable amount, actually exists at sea depths below 2,000 fathoms may be regarded as certain, for well developed eyes are found in most of the fishes, and all the cephalopods which live in from 2,000 to 3,000 fathoms. Mr. A. E. Verrill thinks it probable that at those depths of the ocean more or less sunlight penetrates, forming a soft sea-green light equal in intensity to our partially moonlight nights, and possibly at the greatest depths equal only to starlight.

The Odontological Society will meet on the 3rd inst., when a paper will be read by Mr. F. Newland Pedley, M.R.C.S., L.D.S. Eng., on "Fractures of the Jaw." At the December meeting a communication will be made by Mr. Storer Bennett, F.R.C.S., L.D.S. Eng., &c., on "Herbst's Method of Filling Teeth with Gold."

The antiseptic properties of sulphuret of carbon was the subject of a recent communication to the Académie des Sciences, by M. Ckiandi Bey. The author finds that this sulphide, which is soluble in water, arrests all fermentation, kills all microbes, and is a very powerful antiseptic.

The comparative heating and air vitiating properties of artificial lights were given in the following table at a Lecture on Artificial Lighting, delivered by Mr. R. E. B. Crompton, at the Health Exhibition :—

| Burnt to give light of 12 candles, equal to 120 grains per hour. | Cubic feet of oxygen consumed. | Cubic feet of air consumed. | Cubic feet of carbonic acid produced. | Cubic feet of air vitiated. | Heat produced in lbs. of water raised 10° F. |
|---|---|---|---|---|---|
| Cannell Gas | 3·30 | 16·50 | 2·01 | 217·50 | 195·0 |
| Common Gas | 5·45 | 17·25 | 3·21 | 348·25 | 278·6 |
| Sperm Oil | 4·75 | 23·75 | 3·33 | 356·75 | 233·5 |
| Benzole | 4·46 | 22·30 | 3·54 | 376·30 | 232·6 |
| Paraffin | 6·81 | 34·05 | 4·50 | 484·05 | 361·9 |
| Camphine | 6·65 | 33·25 | 4·77 | 510·25 | 325·1 |
| Sperm Candles | 7·57 | 37·85 | 5·77 | 614·85 | 351·7 |
| Wax | 8·41 | 42·05 | 5·90 | 632·25 | 383·1 |
| Stearic | 8 82 | 44·10 | 6·25 | 669·10 | 374·7 |
| Tallow | 12·00 | 60·00 | 8·73 | 933·00 | 505·4 |
| Electric Light | none | none | none | none | 13·8 |

This table shows the oxygen consumed, the carbonic acid produced, and the air vitiated, by the combustion of certain bodies burnt so as to give the light of twelve standard sperm candles, each candle burning at the rate of 120 grains per hour.

Mr. Thos. Fletcher, writing to the *Ohio State Journal of Dental Science*, says :—"A rapid method of repairing vulcanite plates (the process described by Dr. Crawford in your June issue), of burnishing new rubber on a rough surface with a hot tool, was practised by myself fully twenty-two years ago, and was published by me in the English Dental journals at the time. It was also described in my *Hints for the Laboratory*, published some fifteen years ago, and is now well known in this country. I don't write specially to make any claim, but to call attention to the fact that an equally good result can be obtained by painting a clean, rough surface of rubber with a solution of any of the pink rubbers in chloroform. When the chloroform is perfectly evaporated, the new rubber can be built on, and the whole invested and vulcanized. By this means an edge-to-edge joint can be obtained, showing only a narrow seam of new rubber; and the joint is so strong that a new fracture rarely, if ever, occurs in the same place. In my hands, joints made with the purer red or black rubbers were never so strong as those made with Ash's pink IX., which I invariably used to make my solutions, building up afterwards with this or any other colour desirable."

Some important experiments are being carried on by Lord Lauderdale and Mr. Francis Day with young salmon and hybrid salmonidæ. Certain hybrids were examined and found to contain well-developed milts. This shows that trout and char, or two species of char, will interbreed and give fertile offspring. A little time will decide whether, and to what extent, these hybrids will interbreed. They have also found that salmon may be reared in suitable ponds of fresh water, and also, if properly cared for, will breed without descending to the sea.

"Toothache," says *The Times*, "must hereafter be regarded as a fatal malady. The Behar paper announces that 'Babu Benarasse Lal, one of the leading pleaders of the Judge's Court, Sarun, died at Calcutta of toothache on the 9th ult.'"

A tunnel, measuring about 5,000 feet in length, and constructed at least nine centuries before the Christian era, has just been discovered in the island of Samos. It contains tubes for conveying water.

Dr. Klein's researches in Calcutta have confirmed the view, which he has all along held, that the announcement of the discovery of a specific cholera organism in the comma-shaped microbe is premature.

MONSTER earth-worms are found in many parts of the world. Forty years ago Rapp described a worm six feet two inches in length, which was found near Port Elizabeth. Mr. Beddard, of the Zoological Gardens, recently dissected one sent from Cape Colony, which measured between four and five feet in length and about half-an-inch in diameter.

THE Society of Arts Siemen's Prize for the best application of gas to heating and cooking has been awarded, by the International Juries of the Health Exhibition, to Mr. Thomas Fletcher, of Warrington.

AT the opening meeting of the Medical Society of London, on the 20th ult., Sir Joseph Lister, Bart., F.R.S., delivered an address upon the antiseptic properties and uses of corrosive sublimate. The lecture, which is published in the medical papers, is full of interest.

THREE cases of epithelioma of the tongue and mouth, and operated upon by Mr. Morrant Baker, are recorded in the *Lancet* of the 25th ult.

"STOPPING Teeth at General Hospitals" has been the subject of several letters in the *Lancet*, October 18th and 25th.

DENTAL HOSPITAL REPORTS.—National Dental Hospital monthly statement of operations performed from September 1st to September 30th, 1884. Number of patients attended, 1,659. Extractions—children under 14, 611; adults, 1,008; under nitrous oxide, 372. gold stoppings, 60; other stoppings, 416; advice and scaling, 152; irregularities of the teeth, 80; miscellaneous, 177. Total, 2,876.

DENTAL HOSPITAL OF EXETER, BEDFORD CIRCUS.—Quarterly report of cases, July 1st to September 30th, 1884. Extractions—children under 14, 308; adults, 734; under nitrous oxide, 48. Stoppings—with gold, 9; with white foil, 4; with plastic material, 172. Miscellaneous—Irregularities of the teeth, scaling, &c., 111. Total, 1,386.

# THE
# DENTAL RECORD.

Vol. IV. DECEMBER 1, 1884. No. 12.

## BOOK REVIEWS.

Dental Caries: A Critical Summary, and the Prevention of Dental Caries, by Henry Sewill, M.R.C.S. and L.D.S.Eng. London: Ballière, Tindall & Cox.

Under this title we have presented to us a series of papers, read by the author before the Odontological Society of Great Britain, and then published in the *Journal of the British Dental Association*, collected together and republished in a small octavo volume containing 66 pages.

The name of the author is a sufficient guarantee of the book containing something worth reading; but, after careful perusal, we are certainly of opinion that it contains the most exhaustive summary of our knowledge of this all-important subject to Dentists that has been published.

The first portion is devoted to a criticism of the various views held about the causes of Dental Caries; and throughout there is a certain feeling of pugnacity, which gives piquancy to the reading.

The author handles rather roughly those writers on Dental Caries who base their opinions on "impressions," and who ignore the facts revealed to us by our everyday experience and by microscopical examination.

We cannot applaud too highly the man who boldly and firmly, as our author does, discountenances the teachings of persons led away by the bibliomania to express theories which are not consistent with our everyday experiences. There is an old saying, that "one ounce of fact is worth a pound of theory," and Mr. Sewill is a most forcible exponent of this doctrine.

He, however, frankly confesses at the outset of the book that he is "not an investigator," but "only deals with facts established by others."

He believes Dental Caries to be absolutely non-vital in action, and due entirely to external agencies; and this is the view that we take of it ourselves. There are many copious extracts from the writings of the believers in the doctrine of vital action being one of the accompaniments of the disintegration of the Dental tissues called Caries; and we must say we quite agree with our author in condemning them as an absurd jingle of meaningless sentences, founded on an imperfect knowledge of the tissues of which they treat.

He, however, on page 2, casts a doubt on the operation of Dr. Bödecker that he has been able to demonstrate the enamel to be permeated by fibrils analogous to those in the dentine. We cannot see how this statement, if it be true—and we incline to believe in Bödecker as an observer—clashes with the doctrine of Dental Caries supported by Mr. Sewill. For, he says, he does not believe in the vitality of dentine, and if the vitality of dentine be disproved, we may also assume the want of vitality in the enamel.

While we agree with Mr. Sewill in the opinion that dentine and enamel are incapable of inflammation in themselves, we still must confess that the phenomenon of sensitive dentine is still a subject of surmise to Dentists. Though no blood-vessels or nerves can be traced in the fibrils, there is undoubtedly some substance present capable of transmitting thermal changes or other irritation to the centre of the vitality of a tooth, the pulp. Can Mr. Sewill give an explanation of this phenomenon, which we may call the "*bête noir*" of the Dental operator? Even if personal experience did not convince us of this, the opinion of so great an authority as Mr. Tomes is certainly of some weight. He states, in his "Manual of Dental Surgery," that "the sensitive surface of dentine loses its power of feeling or transmitting pain after treatment with nitrate of silver," and goes on to speak of the "hyper-æsthesia" being attributable to the dentinal fibrils, and continues by stating what we must have all frequently noticed, that on cutting through the surface thus cauterized we come upon tissue just as sensitive as the surface before it was treated with the silver nitrate.

To our mind this is still a riddle, the solution of which lies buried in the bosom of the future.

Of the influence of micro-organisms in the causation of Dental Caries, our belief is that they play a most important part, though how important is a question yet to be determined.

On page 40 the author contradicts himself. He says, in speaking of the non-vascularity of the dentine: "We know that caries goes on unchanged when the pulp, AND THEREFORE THE FIBRILS—which are no doubt protoplasmic—ARE DEAD," showing that in spite of his belief in the non-vital action of caries, the phenomenon of sensitiveness is still unaccounted for, except on the supposition that the fibrils *live* through the life of the central vital organ, the pulp.

We have read this portion of the book with considerable interest, as it epitomises the pros and cons of the two theories of vital and non-vital action of Dental Caries, and for this reason we strongly recommend it to the student of Dental Surgery.

The second part of the book is devoted to the treatment of the disease, and is quite as thorough as the first part.

We cannot say that our experience quite coincides with that of Mr. Sewill as to the Scotch being "in the front rank of Dental development." If he had said the so-called Celtic races, and notably the Irish, we could have better understood it.

If Mr. Sewill brings out another edition of his book, we should like to see more marks of quotation, as in many places it is difficult to distinguish when he is quoting another's opinions or propounding his own.

As a literary production the book deserves great praise, and is a valuable addition to the writings on our speciality, and we most heartily wish it a large circulation.

FREDERICK ROSE, L.D.S.Eng.

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A COMPLETE INDEX TO THE DENTAL COSMOS. Philadelphia: The S. S. White Dental Manufacturing Co.

AN index is a most useful section of a book. The work before us forms a "complete index" to the twenty-four volumes of the *Dental Cosmos*, and contains 30,000 references. It therefore adds greatly to the value of that very successful periodical, making the numerous volumes readily available for consultation. This "index" has been compiled by Drs. James E. Dexter and A. L. Northrop.

"Alveolar Abscess" is quoted 118 times, "Replantation of Teeth" 45 times, while "J. D. White" is referred to 237 times. These three items will serve to indicate the comprehensive nature of the "index," and the amount of labour which the work has involved.

## A DEAD TOOTH.

By W. J. Pidgeon, L.D.S. Eng.

A case has just come under my notice which is interesting, in as far as it illustrates how long a tooth may remain in the jaw after the death of its pulp without causing trouble. The patient, a lady aged 27, tells me that, when a child of about eight years old, she was one day playing in a crib, and falling against the side of it, struck her two upper central incisors so violently as to break off the tip of one of them. This broken tooth had given her no trouble, nor had its fellow till about a week ago, when the gum around the latter one became swollen, and the tooth loose and painful This morning I examined the two teeth and found them both free from caries. No gumboil was present, nor had there ever been one, and the swelling of the gum had quite subsided.

The broken tooth was of the normal colour, but the other, which had been loose and painful, was of a darker shade.

All the evidence tended to show that this tooth was dead; accordingly I drilled through the lingual slope of the enamel into the pulp cavity. There I found only a little pus and no vestige of the pulp.

After due treatment I propose to fill the tooth to the end of the root canal, and expect it will continue to be of service. It seems fair to conclude that the pulp of this tooth was killed at the time of the accident in childhood, in which case it had remained without causing trouble for a period of nineteen years.

# IMPACTION OF ARTIFICIAL TEETH IN PHARYNX.

By W. S. Church, M.D.

*(From St. Bartholomew's Hospital Reports, Vol. XIX.)*

*(Concluded from p. 511).*

## *Cases Fatal from Suppuration.*

In the Museum of the hospital* is part of an œsophagus and pharynx with the surrounding structures, which were removed from the body of a man who, nine days before death, swallowed a fragment of bone, which stuck across the œsophagus just below the level of the cricoid cartilage. Its pointed extremities are imbedded in the ulcerated and sloughing mucous membrane, and, communicating with these ulcerated patches, cavities filled with pus exist on each side the pharynx. The fragment of bone was so situated that the probang when introduced slipped over the bone's posterior border, so that during life no certain indication of its presence was obtained.

A somewhat similar case was brought by Dr. Gairdner, January, 1859, before the Medico-Chirurgical Society of Edinburgh; a woman supposed to have typhus with symptoms of double pneumonia and a peculiar laryngeal cough. At the post-mortem a fish-bone which had passed through the œsophagus was found in an abscess in front of the spine. Pus was found in the pleuræ and pericardium.†

These cases show that though in fortunate instances little harm may result from a lengthened sojourn of a foreign body in the œsophagus, there is very considerable risk to life if they are permitted to remain; and I think that there can be but little doubt that their removal by an operation, when possible, is attended with less danger to the patient than letting the foreign body remain impacted and trusting to the chapter of accidents.

It belongs to the province of the surgeon to decide how low a point in the thoracic portion of the œsophagus can be reached after œsophagotomy with a fair prospect of manipulation being successful, but there can be no question that in the cervical portion of the œsophagus œsophagotomy is to be performed rather than attempts made to push the foreign body onwards to the stomach.

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* No. 1866.

† Quoted from Mr. Durham's article, Holmes's "System of Surgery," vol. ii.

In 1870, in his work,* Mons. Felix Terrier collected all the recorded cases of œsophagotomy for the impaction of foreign bodies up to that time, and since that date I have only been able to find five other cases recorded in full, and mention of one other. Of the five recorded cases, three were successful and two fatal; but in one of the fatal cases gastrostomy was also performed, and death cannot fairly be attributed to the œsophagotomy.

The sixth case I cannot find reported, but it was mentioned by Mr. Barrett† as occurring at the London Hospital; the late Mr. Maunder operating successfully for the removal of a set of false teeth.

Herr Bille's unsuccessful case is the only instance in which the operation has failed to remove the foreign body when œsophagotomy has been done. An examination of the table of twenty-four cases of œsophagotomy collected by Mons. Terrier shows that nineteen recovered. In one there is no mention of the result, but the man probably recovered; in four, death followed. Taking them altogether, there are thirty cases of œsophagotomy, with twenty-three or twenty-four recoveries. The six fatal cases require examination.

Some of the older cases collected by Mons. Terrier have been commented on by Mr. Cock, and I would merely say that Mr. Arnott's was a child aged two, not operated on until thirty-six days after the impaction of the bone, and that death occurred from pneumonia, which was present at the time of the operation. In the other case of a child, Mons. Demarquay's, the coin had been impacted ten days, and a retropharyngeal abscess opened into the pleura. It is, I think, perfectly certain that the abscess existed before the operation.

In the two adult fatal cases, in one, Mons. Flaubert's, eight days elapsed between the impaction of the bone and the operation, and after death the œsophagus was found perforated, and an abscess in the surrounding tissues.

In the fourth case, Mons. Martini's, although the operation was performed early on the fourth day, the man had been submitted to many and violent attempts at extraction, and had even had tartar emetic injected into his veins.

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* L'Œsophagotomie Externe, Paris, 1870.

† *Odontological Society's Transactions*, vol. ix. p. 49.

Herr Bille's fatal case cannot be fairly included, as gastrostomy was performed as well.

These statistics show that there is very little risk in the operation itself, and that a good result may be fairly expected if the operation is done shortly after the foreign body becomes impacted, and before the contiguous tissues have been seriously injured either by forcible attempts to extract or push onwards the foreign body, or as the result of muscular action caused by emetics.

The conclusions I have drawn from a survey of these cases are as follows:—

1. All foreign bodies impacted in the pharynx or œsophagus should be, when practicable, extracted through the mouth.

2. In the case of large objects of irregular shape, emetics are to be avoided.

3. In the case of small objects like fish-bones, &c., when they cannot be caught and extracted, the patient should swallow large mouthfuls of bread-crumb; failing relief by this means, an emetic may be tried.

4. The greatest care and gentleness should be used in attempting to push a foreign body which cannot be pulled up, downwards to the stomach.

5. When a body, in spite of all attempts to remove it, remains impacted, the patient runs less risk by submitting himself to œsophagotomy than by trusting to the chapter of accidents.

In bringing this paper to a close, I will add a few remarks on the passage of foreign bodies through the stomach and intestines.

A perusal of Mr. Poland's interesting and curious article in the Guy's Hospital Reports * leads one to the conclusion that the stomach will for a time tolerate the presence of all sorts of foreign bodies without sustaining much damage, and that the most unlikely bodies pass through their tortuous journey in safety to the anus.

When a foreign body has reached the stomach, it appears to me that the most prudent course is to wait on events and be guided by the symptoms that supervene. Not a few are after a time ejected by vomiting, after a longer or shorter stay there, as in the case already given on page 509, where a set of false teeth was vomited after being retained ninety-seven days in the stomach, during which time they gave rise to but little discom-

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* Third Series, vol. ix. p. 269.

fort. Among Mr. Poland's cases is an instance of a crownpiece being swallowed during an epileptic fit, and remaining in the stomach for a year and eight months, and being then ejected. Dr. Roth* brought before the Medical Society of Strasbourg the instance of a child, three years old, who swallowed a button. When first seen by him, a purgative was administered, but nothing was found in the dejections. Much vomiting occurred; for some time solid food could not be taken, but with a milk diet the child recovered. Two years subsequently the child swallowed another button; vomiting again occurred, and on the twelfth day the button recently swallowed was vomited, accompanied by the one swallowed two years previously.

Even in cases where death has resulted from the presence of foreign bodies in the stomach and intestines, the mucous membrane of the stomach has been found uninjured, as in the celebrated case of the sailor William Cummings, in whose stomach the remains of thirteen or fourteen clasp-knives were found, and who had in the course of his life swallowed and passed per anum seventeen other clasp-knives.

Mr. Little,† so far as I know, is the only surgeon who has successfully removed through the œsophagus and mouth a foreign body supposed to be in the stomach. I venture to say supposed to be in the stomach, because from the severity of the symptoms, and the ease and certainty with which the false teeth were felt by both himself and the house-surgeon, it seems to me not unlikely that they were impacted at the cardiac end of the œsophagus, a spot where foreign bodies appear to have a tendency to stick, and where they produce much more distressing and severe symptoms than when in the stomach. In this case the teeth were withdrawn with ease as far as the pharynx, where they stuck, and required some manipulation before complete removal.

Further experience has probably caused Mr. Pollock to modify the views he expressed in the *Lancet*‡ as to the improbability of hooked and pointed bodies, such as artificial plates with teeth attached, passing through the pyloric and ileo-cæcal valves, numerous cases of larger and quite as irregularly shaped and pointed plates as the one he described having been subsequently recorded as passing per anum.

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* *Lancet*, July 15, 1876, p. 108. † *Medico-Chirurgical Transactions*, vol liii. p. 93.

‡ *Lancet*, vol, i, 1869, pp, 456-490.

In addition to the cases collected by Mr. Poland, I will bring forward a few of the more remarkable instances of the passage of foreign bodies through the intestines recorded in our journals since the publication of his paper. Sir W. Ferguson published* an instance of a gold pencil-case, 4¼ inches in length, swallowed by a gentleman with suicidal intent, which traversed the whole length of the digestive track in twenty-two days. During the two first days there was difficulty in swallowing and inability to take solid food, and it seems probable that during this time the pencil was impacted in the œsophagus; afterwards the man appeared to suffer no discomfort from his indigestible meal.

Dr. Barnes, of Eye, Suffolk, narrates a case† of a child twelve months old who swallowed a hair-pin 2½ inches long. The pin was passed on the fourth day. A safety pin,‡ the size not mentioned, nor is it stated whether it was open or shut, was swallowed by a child eight months old on the 23rd of July, and was passed per anum on the 23rd of September, no symptoms having manifested themselves.

Dr. Dickinson exhibited a large pin at the Pathological Society, November 2, 1869, which a child between two or three years of age was seen to swallow point foremost. Three days later the mother saw the point of the pin emerging at the anus, and removed it. The child apparently suffered no pain or inconvenience during the passage of the pin.

Mr. Anderson, of Cambridge, reported in the *Lancet*§ a most remarkable instance of a foreign body safely travelling through the bowels. A lunatic, 40 years of age, swallowed a door-key 4½ inches long, weighing 9 drachms; a few days afterwards the key was removed from his rectum.

In the *Lancet*,‖ August 12, 1882, mention is made of a woman suffering from melancholia who passed three teaspoons enveloped in hardened fæces and crusted with glairy mucus. The woman stated that she swallowed them all in one day with the intention of committing suicide.

An almost endless list might be made of foreign bodies of all sorts and sizes which have been known to pass through the bowels, whilst comparatively few instances are to be found of foreign bodies being retained and causing death or serious mischief, except in cases where the intestines have been in an unnatural condition, either a constriction of the gut existing, or a hernia being present, or the foreign bodies themselves of so sharp and pointed a character, that they have pierced the coats of the bowel and caused an abscess.

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* *Lancet*, March 12, 1870.

† *Lancet*, March 18, 1871.

‡ *Lancet*, December 9, 1876, Mr. Ayling.

§ May 27, 1870.

‖ See p. 234.

I have not myself found a single instance recorded of false teeth being retained in the intestines, though some years ago I had a patient under observation for several months with colicky pains in the belly, and some slight tenderness in the region of the cæcum, who attributed her condition to having swallowed a set of false teeth. She remained in the same condition until I lost sight of her, and the evidence of the teeth having been swallowed, or, if swallowed, not being passed, was not to my mind very conclusive.

The vermiform appendix is the only portion of the intestines, when in a natural state, in which foreign bodies are apt to be retained, and these are of small size and hardly come into the same category as the cases I have been considering. I mention them here because the view is often held that the older accounts of seeds, &c., in the vermiform appendix are erroneous, and that the bodies found there were fæcal concretions, and not truly foreign bodies.

Mr. Poland gives two instances of pins found in the vermiform appendix. I myself found one surrounded by fæcal matter lodged in the commencement of the vermiform appendix, having the point projecting into the cavity of the cæcum (Museum, Specimen No. 2032); and there is another specimen in our Museum, No. 2033, of a pin or nail which lodged at the distal end of the appendix and perforated its walls. No. 2034 is an example of a gall-stone lodged in the appendix and causing destruction of its coats. Dr. Payne, November 2, 1869, exhibited at the Pathological Society a pin situated in the vermiform appendix encircled by semi-crystalline concretions.

From these and numerous other examples, it is evident that there is considerable risk of foreign bodies of small size lodging in the vermiform appendix. At the same time the post-mortem records of the hospital prove that in by far the largest number of deaths from mischief in and around the vermiform appendix no foreign body was met with.

It is obvious that any foreign body which has passed through the small intestines can pass along the colon and rectum, but the pouched condition of the large intestine seems not unfrequently to interfere with the safe passage of elongated bodies through it, and hence there are a good many instances of the impaction of knife-blades, &c., in the rectum, and much pain and tenesmus has occasionally preceded the expulsion of foreign bodies from the rectum. Artificial teeth have stuck in the rectum after having easily and rapidly accomplished all the rest of their journey.*

*Treatment.*—All authorities appear to be agreed that the use of purgatives is to be avoided, and not a few recommend a constipating diet. Mr. Pollock† speaks, as it seems to me, too confidently of the value of emetics given on a full stomach. I have mentioned several instances of coins, sets of false teeth, &c., &c., being spontaneously vomited, but emetics have generally proved useless, and, as I have already shown, they might cause much harm in the event of the foreign body becoming impacted in the œsophagus in its upward journey. Mr. Carter,‡ however, mentioned a case at the Medical Society, in which a brooch accidentally swallowed was vomited after an emetic given immediately after a plentiful meal of bread. The size and shape of the foreign body would guide one as to the propriety of trying emetics, but in all cases of pointed bodies, or of those with sharp hooks and points, like artificial teeth-plates, I should consider them dangerous. I do not myself see that any advantage is likely to be obtained from the administration of tow, wool, or thread, as suggested by Dr. Dickson, and spoken of by Mr. Weiss as a most valuable suggestion. Tow and shreds of cotton, when taken into the stomach, would be likely to act as irritants, and if they did collect round the foreign body, would probably leave the projecting points exposed. A copious diet of food containing much indigestible matter and plenty of oil, appears to me the most suitable treatment. Olive-oil, when taken in large quantities, has a tendency to form semi-solid masses in the bowels, which have been before now mistaken for gall-stones when discharged in the fæces. It seems probable that these gummy masses might form around a foreign body, and so assist in covering in its sharp edges and angles. A plentiful supply of woody fibre and other indigestible substances, favours the formation of large and bulky fæces, wrapped in which the foreign body might painlessly and safely pass through the last part of its journey to the anus.

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* Dr. Julius' Case, *Lancet*, April, 1860.

† Loc. cit.

‡ *Odont. Soc. Trans.* vol. ix. p. 173.

*Cases in which Œsophagotomy was Performed for the Removal of Foreign Bodies from the Œsophagus.*

| No. | Sex and Age. | Nature of the Foreign Body. | Seat of Impaction. | Result. | Observations. | Name of Operator. | Where Recorded. |
|---|---|---|---|---|---|---|---|
| 1 | M. 25. | Plate with two teeth attached. | Œsophagus. | Death. | Swallowed during sleep. Death eleven days after operation from suppuration in the mediastinum. Duration of the impaction not stated. | Prof. Von Langenbeck of Berlin. | British Medical Journal, Feb. 1, 1879. |
| 2 | M. 58. | Portion of an œsophagus and stomach cleanser. | Lower end of œsophagus and stomach. | Death. | The instrument measured $12\frac{1}{3}$ of an inch. Partly impacted in the stomach and partly in the œsophagus. Œsophagotomy failing, gastrostomy also was performed. | Herr Bille. | Berlin. klin. Wochenschrift, No. 38, 1880. |
| 3 | F. | Plate with artificial teeth. | Œsophagus above the level of the clavicle. | Cure. | The teeth had been impacted five weeks. They could be grasped by forceps, but could not be removed. Great pain was suffered. | Mr. M'Keown. | Clin. Soc. Trans., vol. xi. p. 233. |
| 4 | M. | Molar tooth of a sheep. | Œsophagus. | Cure. | Impacted four days before operation. Great pain and cyanosis. | Dr. Krönlein. | British Medical Journal, Feb. 1, 1879. |
| 5 | F. 23. | A chestnut. | Low in œsophagus. | Cure. | Chestnut could be easily felt, but could neither be extracted nor pushed onward to the stomach. Impacted one day. | Herr Bille. | Berlin. klin. Wochenschrift, No. 38, 1880. |
| 6 | .. | Plate with teeth. | Œsophagus. | Cure. | I am unable to find any report of this case, and mention it on the authority of Mr. Barrett. | Mr. Maunder. | Odontol. Soc. Trans. vol. ix. p. 49. |

## THE BUTTNER CROWN.

*A Paper read before the Iowa State Dental Society, May 6, 1884.*

By Dr. J. E. Low, Chicago, Ill.

(An abstract from the *Ohio State Journal of Dental Science.*)

The Buttner crown does away with many of the objectionable features of the so-called Richmond crown, which has been recognized by the profession generally as the best before the Buttner was known, and when properly adjusted and good judgment is used there is no doubt about this. The fact that there have been many failures made by parties using this crown, does not detract from the principle or its merits. One of the principal reasons for so many failures can justly be attributed to driving the bands too far under the gum. In many instances this has been followed by inflammation and loosening of the root, which is a natural consequence. This objection is entirely obviated in the Buttner crown, as no pressure or rough edges are left to irritate or cause inflammatory action. A trephining instrument being used, the tooth is turned perfectly round to a size indicated by the size of the root, and when completed the root is entirely covered and protected, so much so that they can be made to hold without cement, and Buttner tells me that all the first crowns he made were put on without cement, and they still remain, doing good service. It was found to be more practical to change instruments and use a small amount of cement on account of the necessity of removing caps several times to fit and arrange the tooth. The Buttner crown has the good qualities of all crowns, and many qualities others have not. They are perfect in appearance, show no gold, and still stronger than any other crown. I have been using them in connection with bridge-work quite extensively where scattered roots were present and a porcelain front was desirable. . . I mention bridge-work in connection with crowns simply because the two are inseparable in many instances. Take this case before us. The crowns of the teeth are gone. If we use the crown alone we have restored to usefulness only three teeth, and four teeth are still missing. If we supply these teeth with crowns only, a plate would have to be used to supply the remaining vacancy, and these crowns can as well carry seven teeth as three, and avoid covering the roof of the mouth, a desirable consideration. Then, again, we have, when this case is completed, a system of crown-work from root to root. . . . The manner of adjusting the Buttner crown is quite simple. Should we desire to crown a tooth, we first ascertain the condition of the nerve cavity. If we find the nerve destroyed, the next important point is to know the condition of the root; is it a healthy one, or do we find it diseased? If diseased, one of two things must be done to insure success, either the root must be treated or a tube must be used instead of the solid pin in the centre. The root can then be treated through the tube opening, cured and closed up.

The drill is first used to drill a hole the depth necessary for the instrument to be used in cutting the root. The planer is then used to level the root, after having ground or cut with excising forceps the tooth the length desired, and the shorter the easier the tooth is arranged. It is advisable to cut the root short, and use a small instrument, so as not to lacerate the gum. We should make all such operations as painless as possible. After planing the root down level, the cutter is used. While using these instruments a stream of water must be kept running on the instrument and root, by the assistant. After cutting the root, the cap which is kept on hand, made of platinum, fitting all sizes of instruments, is slipped on the root. The tooth is then selected and fitted. Should the pin in the cap, which extends through, be in the way of arranging the tooth, cut it nearly off, and with pliers turn to one edge of the cap and solder fast. As it is needed to remove the cap in arranging the tooth, should the cap prove to be so prominent that the tooth could not be brought into the desired position, take the engine and with stone cut the lower portion of the cap and tooth sufficient to set the tooth in proper position. The part of the tooth and cap can be cut without injury, then cover with thin platinum the entire length of the tooth, and over this thin platinum using as a backing say about No. 28 platinum; then bend down the pins to hold all firm in position. After having been ground, fitted and backed, it is placed in position and held with a preparation of wax, gutta-percha and rosin, or any other substance of sufficient strength. Then with a pair of forceps grasp the pin and gently remove the tooth and cap together, and insert in plaster and sand or asbestos. Remove wax, solder and finish, and the tooth is ready to be attached. Should we wish to supply the vacancies in connection with crowns, we would place these caps in their respective positions on the roots, take a deep impression of the teeth and mouth, and a correct articulation in wax, from which the case can be completed. Any other crown can be used in a like manner, should the operator desire. I know of no crown that can be made as quick or as cheap, or that is as strong and perfect as the Buttner. There are a few improvements that will make this crown perfect, and bring it into use for all crowns used in the mouth. I can see no reason why they will not be used for all molar teeth in the near future. The fact that the neck of the tooth is made round is no objection, as a nicely shaped gold crown can be soldered to the cap, making a perfect, strong and useful tooth.

An instrument like the one used by Buttner for putting on teeth, where the nerve still remains alive, with the socket twice the depth, having a centre pin attached to a spring to hold the instrument in position, can be used successfully on all teeth in mouth that are desirable to crown, and which are not too far decayed, in which case the gold crown takes the preference in most cases. It has been but a few years since the opposition to gold crowns was extensive, and now but few Dentists do without them, and no Dentist without their use can expect to approximately compete in preserving the natural teeth and natural conditions with one that uses them. The making and setting of a gold crown has been made very easy and simple, so that every Dentist can, with a little perseverance, become an expert. Measure the root with a strip of block tin about the width you desire the length of the crown; after placing around the root and pressing gently close to the gums with pliers, draw the tin tightly around the tooth; remove the tin, cut where the plier marks indicate the size, cut the gold to this pattern, solder together and drive over the root. After having fitted properly, cut off sufficient to allow the tooth to articulate, and with wax take an articulation of the band and a few of the adjoining teeth; remove the wax and band, place the band in the wax and place in articulators; then these struck up caps, of various sizes, can be selected, the band cut down so as to allow the cusps to articulate properly; stick the cap to the band, remove band and cap, fill the band with plaster and sand, solder and finish, and you have perfect articulation and a satisfactory piece of work with a small amount of labour.

One thing more in regard to the Buttner crown: It has been said that it could not be used on badly decayed roots. I will here state how it can be used with perfect success and with as little if not less labour than any other crown. Suppose we have the broken walls of a central or lateral incisor for an illustration, with a portion of the walls broken nearly or quite to the alveolar process. After pressing the gums back by the use of gutta-percha for a day or so, all decayed tooth substance is removed. A twist drill of sufficient size is used to drill out and enlarge the nerve cavity, having previously made all necessary under cuts, where the tooth substance was sufficiently strong. Then enlarge the nerve cavity a sufficient size to admit the adjustment of a large, strong platinum tube, with a screw cut on the end a shade larger than the drill used. Place the tube in an instrument and turn into the root, and see that it is a perfect fit. Remove moisture, place a little cement on the screw, and turn into place. Beard that portion of the tube below the screw. Fill around the tube and build down that portion of the tooth which is deficient with amalgam. Being perfectly packed, the patient is discharged for the amalgam to harden. When the patient returns we have no centre to drill. The planer is placed in the tube and the root planed level. Then proceed to set the crown as before described, and you have a strong and desirable crown when thoroughly done. I have been asked how I crowned long, bicuspid teeth, the root being oblong and the trephining instruments being round. The root is cut down the regular way, cutting the labial portion of the tooth so the cap will come to that side of the root ; place the cap in position ; take an impression of the root and cap ; place the cap in the impression, and pour with plaster and sand, having previously varnished the impression, so they can be easily separated. Cover over the balance of the root with thin platinum as desired, and solder to the cap. We then place back on the root, then proceed to set the tooth as described.

## ODONTOLOGICAL SOCIETY OF GREAT BRITAIN.

THE ordinary monthly meeting of the Society was held on November 3rd, Mr. J. S. Turner, President, in the chair.

The Curator (Mr. Hutchinson) having brought forward two donations to the Society, and the Librarian (Mr. Weiss) reported several additions made to the Library, Mr. Morton Smale showed models of a case in which there was congenital absence of both temporary and permanent lower incisors. The patient was a boy, and the models were taken at the age of nine years and twelve years respectively. In the upper jaw the permanent laterals were absent. The rest of the family presented nothing peculiar as regards their dentition,

He also showed models of the mouth of a female patient, aged twenty-five, in which all the permanent incisors, both upper and lower, were absent. In this case the father had the same deficiency, but out of several children only this one daughter resembled him in this respect.

Mr. Arthur Underwood said he had then under his care a case which puzzled him, and with regard to which he should be glad to obtain the advice of those present. His patient was a middle-aged gentleman, who had a very fair set of teeth, all healthy, but a good deal worn. The only teeth which troubled him were an upper and lower molar ; these were much worn, the enamel covering the cusps being gone, and the dentine exposed. The teeth were, however, completely insensitive except at one spot in each tooth ; but here there was most acute sensibility. The sensitive spot occupied precisely the same situation in each tooth, being confined to a very minute point of what had been the anterior external cusp. Exposure either to heat or cold gave intense pain. There could be no doubt but that a small filament of the pulp was exposed, though he could not detect any evident signs of this even by careful examination through a magnifying glass.

The question was as to the best way of dealing with such a case. He had first tried the application of strong carbolic acid, but this did no good. He then applied chloride of zinc. This caused intense pain for a few moments, but after two or three applications the sensitiveness was greatly diminished, and eventually he dismissed the patient in a decidedly hopeful frame of mind. But at the end of a week he returned, saying that he had been pretty comfortable for a few days after the application, but that then the sensitiveness returned as acutely as before. Mr. Underwood again used the zinc chloride, with the effect of giving temporary relief, but he should be glad to hear of some more effectual and lasting method of treatment.

He would add, with reference to the explanation he had suggested, that it was not very uncommon to meet with cases in which prolongations from the pulp were found in unexpected proximity to the surface of a tooth. Thus, in a case he had seen at the Dental Hospital, a filament of the pulp of a bicuspid tooth extended quite to the surface of the dentine, and exposure of the pulp resulted from the mere accidental chipping off of a small fragment of enamel.

Mr. Walter Coffin remarked that in looking at a section of a tooth made through the horns of the pulp under the microscope, it was very difficult to tell exactly where the pulp tissue ended, and it had often appeared to him that it approached a good deal nearer to the surface than was generally supposed.

Mr. D. Hepburn said he had noticed that the most common situation for an exposure of the pulp in molars was just the part which Mr. Underwood found so sensitive in this case, viz., the anterior external cusp. Of the sensitiveness of the pulp, even when not exposed, he had had a remarkable ocular demonstration in the case of a patient with unusual transparency of the teeth caused by attrition, resulting from an edge to edge bite. The outline of the pulp cavities of the incisors could be distinctly seen, and in the case of one of the canines, though it might sound almost incredible, he could actually see the nerve retract when an instrument was passing over the surface of the tooth.

Mr. W. A. Hunt said he had met with a case somewhat similar to that described by Mr. Underwood, but unfortunately he had only seen it at a much more advanced stage. A healthy young man came to him complaining of tenderness about a lower left central. The tooth was evidently dead, and there was a fistula over the root, but it was not carious ; the rest of his teeth were good, and he had not met with any accident. It was extracted, and on examination a minute canal was found leading from the surface of the tooth to the pulp cavity. No doubt this had been closed externally by a thin layer of enamel, which had been worn away or been broken through, and exposure and death of the pulp had been the result.

Dr. Field suggested that, as apparently only a small filament from the pulp was involved, the best treatment would be to destroy this by the application of some strong escharotic, cut away a small portion of the dentine, and cap with cohesive gold.

Mr. Stocken said that under the circumstances described by Mr. Underwood he should be disposed to drill a small cavity in the dentine, and then fill it with osteo. He had met with a case having some points of resemblance to that quoted by Mr. Hunt. A patient consulted him with reference to stopping a lower molar. There appeared to be nothing abnormal in the condition of the tooth, which seemed well suited for a gold filling. He filled it accordingly, without the slightest discomfort to the patient. About a year afterwards the patient returned, and reported that she had occasional twinges of pain when she took hot or cold things into her mouth. Mr. Stocken carefully examined the tooth, but could not find any cause for the pain; however, as the sensitiveness continued, he substituted an osteo filling for the gold. As this was not followed by any improvement, he removed the osteo, dressed the cavity with escharotics, and plugged it with gutta-percha. This gave only transient relief, so he cautiously opened the pulp cavity, and to his astonishment found the pulp dead, almost dry and free from any unpleasant odour. He treated the cavity with antiseptics, and re-stopped with osteo; since then the patient had not had the slightest inconvenience.

Mr. Browne-Mason said he should not have hesitated to use the actual cautery in such a case as Mr. Underwood's; this would have destroyed the fibril, and he should not have anticipated any harm being done to the pulp.

The President said he had a patient, a very powerful man, who had an inveterate habit of grinding his teeth, which were a good deal worn in consequence, and presented occasional sensitive points. The most troublesome teeth in this respect were two lower molars. He (Mr. Turner) was in the habit of removing this sensibility by applying fuming nitric acid by means of a pointed piece of wood. He then polished the teeth with a fine corundum point, and the patient would be free from pain for a year, when the same operation had to be repeated.

Mr. Moon remarked that it was of course a well-known fact that the horns of the pulp approached the surface more closely under the cusps of the molars than elsewhere. With regard to the treatment of the case, he could only add one suggestion to those already made, and that was, that if there was any probability of artificial teeth being required, Mr. Underwood should take advantage of the opportunity to raise the bite a little.

Mr. Underwood, in reply, said he was very much obliged for the suggestions which had been offered. He felt very unwilling to cut into a sound tooth, and thought that the insertion of a metal stopping in such a case would not improbably be followed by irritation of the pulp. He hoped that the adoption of the plan suggested by the President might render recourse to any such measures unnecessary.

Mr. Ackery showed models of two cases of transposition of a permanent canine; in one case it occupied the position of the central incisor of the same side, in the other that of the first bicuspid. The temporary canine persisted in both cases.

Mr. Willoughby Weiss showed a left upper lateral, with a very well-developed supplementary cusp.

He also related the history of a remarkable case of salivary calculus surrounding three lower incisors, and showed a model of the patient's mouth. The patient, a woman, first came to him in April, 1881; her mouth was in a very dirty and neglected state; there was a good deal of tartar about the teeth, but especially about the root of the lower left central, which was entirely surrounded by the deposit. The tooth was loose, and could be removed and replaced by the finger. She refused to have anything done, and was not seen again till June, 1882, when the right central was found to be affected in the same way. She again refused to submit to any treatment, and disappeared until July, 1883, when the left lateral was found to be similarly affected. During this time she had suffered no pain, and was able to masticate fairly, although all three teeth could be removed and replanted at will. About January, 1884, the gums began to get tender, and about the beginning of May she had to take out the loose teeth while eating, replacing them afterwards. At last, in July, 1884, she allowed Mr. Weiss to remove the three teeth, together with the right lateral, which was getting loose, and an artificial denture was fitted. The peculiarity of the case was not the amount of the tartar, but the way in which it was deposited round each tooth, so that each one, as it were, locked its neighbour in its place.

Mr. Redman exhibited a face-piece which he had used in the administration of anæsthetics for three years past, and found to fit better than any other which he had tried. It would be found specially useful for patients with thin, hollow cheeks, and for men with thick beards, &c.

The President remarked that he had seen a very good face-piece extemporised out of a child's india-rubber ball.

Mr. W. A. Hunt showed a lower molar which had been obliquely fractured during the operation of abstracting an upper molar with the key. The fracture had, however, been closed by the deposit of secondary dentine within the pulp cavity, and when the tooth was extracted, thirty-three years after the accident, the pulp was found to be healthy.

Mr. Dennant said he had a suggestion to make. Those who had been present at the reading of Mr. Campbell's paper at the meeting of the British Dental Association at Edinburgh, would remember the very clear and satisfactory manner in which models of the cases he described were exhibited by means of the oxy-hydrogen light. He wished to suggest that it would be a good plan if the Society were to have some similar demonstrations occasionally. Instead of, as at present, getting the model five or ten minutes after the case had been described, members would then be able to follow the description with the model displayed before them. All that was necessary was to have the models photographed beforehand, and this could be done at very trifling expense.

The President said he was informed that Dr. Walker had provided himself with a lantern for use at his lectures on Dental Mechanics, and that he had very kindly placed it at the disposal of the Society for use at the meetings if desired. This lantern was an improvement on that used by Mr. Campbell, in that the representation on the screen could be made from the model itself, without any necessity for its being photographed. He saw no objection to the plan being tried if the members wished it.

The following paper of the evening was then read :—

## Some Points Connected with Fracture of the Inferior Maxilla.

By F. Newland Pedley, M.R.C.S. & L.D.S.Eng.

The subject which I have undertaken to bring before you to-night is one that is peculiarly interesting to us, for it gives the widest scope to that combination of manipulative skill and surgical knowledge which forms the ideal of modern dentistry.

The title of this paper sufficiently disclaims any intention on my part of attempting an elaborate thesis on the wide subject of fractures of the maxillæ. The production of the last edition of

Mr. Heath's well-known book on "Diseases of the Jaw" added much to a literature which was in some respects deficient; for, at the time I undertook to write this paper, I knew of no familiar work that contained a clear description of Hammond's splint, save the last edition of "Holmes' System," and even there I had been permitted, by the kindness of Mr. W. H. A. Jackson, to supply some of the details.

There remains, perhaps, little I can bring before you to-night that is original or novel, but I shall be more than contented if the record of my past experience in this subject, acquired in hospital, shall be of practical utility to some, and confirmatory of the views of others.

General hospitals offer the best field for the study of this lesion, and I am led, by comparing notes with my professional friends, to infer that Guy's Hospital is especially favoured in the numerous patients with fractured maxillæ who seek aid there.

I have, for some years, studied these cases in assisting Mr. Moon, and could willingly believe that their numerical significance is solely attributable to an intelligent appreciation on the patients part of the successful form of treatment adopted there; but the suggestive fact cannot be ignored that the hospital drains much of the low district of transpontine London, where heavy boots and clenched fists are the emblems of law and marital authority.

Kicks and blows amongst young adults cause most of the cases that we see; for after middle life the loss of teeth, laxity of capsular ligament, and flattening of the articular surfaces, favour dislocation rather than fracture.

The commonest site is close to the canine tooth, because the bone narrows somewhat at that point, and the great depth of the socket of the tooth tends further to weaken the bone.

The site next in order of frequency to be affected is the angle of the jaw, and then fractures through the neck of the condyle. Separation of the lateral segments of the lower jaw at the symphosis is not common, although I have seen several instances of it, and, as one might expect, it is more prone to occur in early life than later. Multiple fracture is frequently met, and in any given case too careful search cannot be made for a possible second or third point of division. The diagnosis of condyloid fracture under such circumstances is not easy, for crepitus is transmitted along the bone from the more anterior spot, and combines with the mobility of the joint in rendering tactile evidence nugatory.

The treatment of a break in any part of the ascending ramus is most unsatisfactory, for the teeth are almost useless as fixed points in the application of a splint, and the upper fragment is short, movable, and attaches powerful muscles. These are the cases in which little can be done but to apply the old gutta-percha external splint, or " boot " as it has been termed, and the same objection to its use is valid against all those other splints that have been devised to retain the fragments in correct position by means of a framework round the teeth, carrying a pad or wings that maintain counter-pressure upon the outer surface of the cheek over the site of fracture. Lonsdale's, Hill's, and Moon's splints represent this class; of which the latter is said to be the best, yet the inventor has abandoned its use of late years in deference to its defects.

The consequent pain and swelling of the face necessitate the relaxation of the pressure, and in the graver cases, where a sinus with an external opening becomes established, the gutta-percha splint becomes a mere receptacle for putrefying discharges, and is worse than useless.

Little is necessary but to enumerate the previous forms of apparatus; for a familiarity with the use of Hammond's splint renders the admission imperative that it possesses great superiority over all others in those cases where there are firmly implanted teeth in each fragment.

The favourable results that Dental Surgeons obtain from the use of this splint in hospital practice derives additional force from the consideration that it is chiefly in the complicated cases that the skill of the dental specialist is invoked. This fact was strongly impressed upon my mind in conversation with Mr. Bryant when I was disparaging his splint for fractured inferior maxillæ. There were several of these hospital patients under his treatment at the time, and he maintained that 75 per cent. of the aggregate number of fractures got well under any treatment, and a great proportion of them escaped attention as Dental Surgeon's cases. The splint Mr. Bryant was using was made of several thicknesses of plaster of Paris bandage, accurately moulded to the outer surface of the chin and jaw; with the four-tailed bandage as a support.

I watched the patients in question, and was constrained to admit that they progressed favourably, and that the plaster of

Paris bandage was light, efficient, and easy of application ; yet I think that the more favourable instances of fracture are essentially those which would also yield the best results in the hands of general practitioners by a modification of Hammond's splint much used at Guy's Hospital, and which I will subsequently describe. The exercise of great manipulative skill, in such instances, is not exigent, and there is no need to take a cast of the mouth or to solder the wire.

The typical Hammond's splint, which he has recently described so well, is only demanded where the fracture is multiple, or the displacement is obstinate, and on all occasions the aid of a Dentist will wisely be sought in its preparation.

The teeth contiguous to the line of fracture are temporarily fastened together with silk, whilst impressions of the lower and upper jaws are taken in "Stent's" composition or wax ; and plaster casts obtained. This is no easy matter, even for a Dentist, in severe cases ; for he is embarrassed by the swelling of the face, and the inability of the patient to open the mouth sufficiently for the introduction of a full-sized impression-tray. The mobility of the fragments, and the great pain occasioned, necessitate the use of very soft impression material, and the avoidance of firm pressure. On one occasion I was glad to use half-trays, and to take the impression of half the jaw at the time. This method is less distressing to the patient, and I see no objection to its adoption, provided the upper teeth offer a satisfactory guide for the subsequent articulation of the segments of the lower jaw.

The plaster model of the lower jaw is sawn through at the point or points of fracture, the displacement is corrected, and the normal occlusion obtained by the use of the cast of the upper jaw as a guide. Plaster of Paris is used to fix the segments in their right position.

A loop of wire is framed upon the corrected model, passing behind the last tooth on each side of the lower jaw, surrounding the dental arch like a collar, and accurately fitting the necks of the teeth at the margin of the gum.

Reasons that I have mentioned may lead to the use of models that are imperfect in the region of the back teeth, and in shaping the splint it is not very important if the wire passes somewhat wide of the posterior surface of the last tooth. The least error in the opposite direction renders the appliance utterly useless.

The wire strand, thus prepared, is slipped over the teeth of the fractured jaw by reducing the displacement, and is secured to two or more teeth on each side of the mouth by means of a binding wire passed in a "figure of 8" round the individual tooth. Quoting Mr. Hammond's description of the "figure of 8," the wire is to be passed between two teeth, "directing it slightly downwards, so that the end will come out under the inner bar of the frame. Have the forefinger of the left hand inside to feel for the point, and with it turn the wire upwards and outwards, so as to avoid wounding the tongue. Then bring the wire back over the inner bar of the frame and under the outer; cross the ends," and twist them together loosely.

The wires do not cause irritation of the gum if a mouth rinse of spirit (1—6) of water be used.

This mixture finds much favour amongst hospital patients, if made from rectified spirit, for it seems to bear a vague but definite resemblance to whatever form of alcoholic preparation the patient may be addicted to.

The more obstinate the displacement, the stouter should the main wire be, provided the teeth be not too short in the crown to retain it in position.

A very useful modification of Hammond's splint is much used at Guy's Hospital, by which the necessity of soldering and model-taking is obviated: points of special recommendation to the general practitioner.

By its adoption the treatment of the milder forms of fracture is greatly facilitated, and it is especially applicable where the lesion is situated anteriorly, and the displacement is not very marked.

The main strand is not passed behind the last tooth, but between two teeth on each side of the jaw in the following manner. The point of the wire is sharpened by being divided obliquely with cutting pliers, and is passed into the cavity of the mouth between the bicuspids or the more posterior teeth, and is brought out again by being passed, from the lingual surface, between two teeth on the opposite side of the jaw. The intervening portion now lying on the tongue is manipulated into close contact with the lingual surface of the necks of the teeth. The wire is then carried across the labial surface of the teeth, and its ends twisted loosely together. It is not desirable to twist up the main strand very tightly at first, for so doing would impede the passage of the binding wires, and tend to drag away the strand from the lingual surface of the teeth. The binding wires are passed in the usual way, and twisted together, loosely at first. Finally, all the wires are twisted tight, a few turns being given to first one and then another ; the ends are cut short and tucked under the splint to avoid excoriation of the mucous membrane. Rarely should a binding wire be attached to a tooth immediately contiguous to the line of fracture, for loosening of such a tooth is the usual result.

A few special points, as regards the passage of the main wire, are worthy of mention. The teeth should be scaled, and a steel probe should be used as a pilot, and as a gauge of the precise available amount of space between any two teeth.

Usually the chosen interspace on one side of the mouth is a little wider or more favourably situated than on the other, and it is well to begin the operation on the more difficult side, for the light is better and the tongue is not in the way at first.

A slight upward curvature of the end of the wire makes it easier of passage between the teeth, and lessens the risk of pricking the side of the tongue, or the cheek, which is liable to occur at the moment when the short sharp end of the strand emerges from between the teeth, and requires to be raised. A slight perforation of the gum margin is often necessary, and causes little pain or subsequent irritation ; but the tongue and cheek require protection with a finger of the left hand. The prick or scratch that the surgeon's hand is liable to sustain is of slight extent, but strongly suggestive of traumatic inoculation. This is one of the reasons that have induced me to devise two pairs of forceps of a suitable curvature, length, and strength, and a spoon-shaped spatula to protect the mucous membrane of the mouth, to reflect light, and to direct the tip of the wire upwards. A blunt hook with a notched point, and somewhat similar instruments with curves in opposite directions, are useful in manipulating the wire into contact with the lingual surface of the teeth.

Mr. Moon has latterly introduced an improved method of fastening the ends of the main strand, in place of twisting them together, and hence less likely to displace the fragments. The principle consists in passing the ends of the main wire through a short piece of closely-fitting metal tube, then giving them a sharp bend in the opposite direction, and cutting short. A soft sheathing for the joint in the wire is afforded by a piece of caoutchouc tubing threaded on to the main strand before the metal tube is fixed.

The result obtained by this modification of Hammond's splint is all that can be desired in cases where there is no obstinate horizontal displacement, or where there is only a slight amount in a vertical direction: the latter tends to correct itself. In recent cases an advantage will be obtained by allowing a day or two to elapse before treatment is commenced, in order to diminish the swelling consequent upon the direct violence that caused the fracture. I have only seen one case in which the fracture was not compound, but the risk of considerable necrosis is very slight, and fatalities are very rare.

A fatal case, however, came to my knowledge, which occurred at Bedford, in June last. The patient's jaw was broken at the angle, and near the canine tooth, in a fight.

A gutta-percha splint was applied externally, and failed; and then a gutta-percha appliance was tried inside the mouth. The patient was suffering from a severe cough, and the fragments became displaced. The splint was removed, hæmorrhage occurred from the floor of the mouth, which eventually led to ligature of the common carotid artery. The hæmorrhage ceased, but the patient died.

Treatment may, as a rule, be long deferred, but the most unsatisfactory cases that Dentists are called upon to deal with are those that have been long neglected, or represent the failures of general practitioners. Here we may frequently have to cope with marginal necrosis, and, worse still, with so much callus that it is absolutely impossible to place the fragments in correct position. Such an instance occurred to me last Christmas-tide, and I reported it, amongst numerous others, before the Students' Society of this hospital.

The fracture was oblique, of long standing, and much callus was present. I made an attempt under the full influence of chloroform to reduce the displacement, but in vain. This naturally suggested to me the resection of the ends of the bone, and I think it would have been the correct procedure, if the personal appearance of the patient were of primary importance; but as this patient was married, and it was her own husband who had broken her jaw, I was reconciled to the slight deformity that persisted.

As regards the use of an anæsthetic, it will seldom be requisite and always dangerous: for the tongue becomes thrust backwards by the fingers of the surgeon, and the abundant flow of saliva collects at the back of the mouth, threatening suffocation to the patient. Once only I was obliged to use chloroform for a refractory child; on the other hand, I have succeeded in applying a modified Hammond's splint in the mouth of a patient five years of age, without producing lachrymation, or other obvious signs of disapproval from the little sufferer.

Touching the period during which the wire should be worn, I look upon six weeks as the shortest period, and at the expiration of that term I keep the patient under supervision until I am quite certain that firm union has taken place. The splint causes no inconvenience whatever after a time; in fact, one child was not brought back to me for five months, and the mother apologetically explained that she had been much engaged, owing to a recent increase in her family and other domestic cares, so she had deferred her visit to the hospital, as the wire was comfortable. Meanwhile, the crowns of the developing permanent lateral and canine teeth of the lower jaw were discharged through a fistulous opening by the side of the chin.

This is the only instance which has come under my observation in which the successional teeth have been discharged through the skin at the site of fracture; although it is a common thing for flakes and spicules of necrosed bone to be exfoliated. I much doubt that all these small fragments of necrosed bone are primarily due to comminution of fracture. Weeks and months sometimes elapse before they come away, and it is not improbable that some of these light sequestra are due to necrosis of the margin of the fractured bone, consequent upon the inflammation occurring at the seat of lesion as a result of the mobility of the fragments and their laceration of the surrounding soft tissues. Whatever its correct pathology may be, this exfoliation of necrosed bone greatly retards repair.

There is still another field of surgical practice, closely allied to fractures of the jaw, and eminently suitable for treatment by the wire-splint. I allude to those instances where the lower jaw has to be divided in order to obtain access to malignant growths of the tongue, or floor of the mouth. I reported a case of this description before the Society some months ago, but from press of time it received scant consideration, and I promised to bring the subject forward again, when I should be in a position to give the result of the treatment.

The patient was suffering from epithelioma of the floor of the mouth, and division of the lower jaw was a necessary step in the removal of the growth. Mr. Moon was consulted, and some days before the operation the teeth were thoroughly scaled, and a full Hammond's splint was made and fitted. At the subsequent operation Mr. Clement Lucas divided the jaw through the socket of an incisor tooth, removed at the time. The tumour was excised, and then the fragments of the bone were brought together and fixed in their correct position by means of the Hammond's splint, which was secured to the teeth with binding wires in the usual way. The patient recovered perfectly, with a correct articulation of the teeth. The splint shown is the one worn by the patient. The credit of the conception is not mine.

The above method is obviously better than the plan of uniting the fragments by means of wire sutures passed through the substance of the bone.

The latter practice has received fair trial, but with very questionable results. The tension of such sutures holds the parts very firmly together at first, but is very liable to cause subsequent loosening from absorption of the surrounding bone. The space between the roots of the lower incisors is so slight that there is great risk of the teeth being injured or periodontitis set up.

In reviewing the steps of the operation, as performed by Mr. Clement Lucas, one possible improvement suggests itself, viz., that the section through the lower jaw should not be merely vertical, but should be made by two oblique cuts meeting at an angle, as described in some books.

In this way the ends of the fragments lock into one another, and retain their position, although the whole of the periosteum is divided, and the cut surfaces of the bone are smooth.

The material used for Hammond's splint, in hospital practice, is iron wire, for its cheapness is a consideration, but in private practice I should certainly prefer gold.

The deterioration in value of sufficient wire for a splint would be very slight, and it has the recommendation of strength, colour, pliability and cleanliness. By selection, and by habit of use, gold is the metal to which a Dentist would naturally and rationally turn in devising a mechanical appliance to be worn in the mouth. A few simple experiments upon my own teeth have confirmed me in this belief, and enabled me to speak from a patient's point of view.

The claims of Gunning's splint cannot be ignored for those cases in which firmly implanted teeth do not exist in each fragment of the fractured bone, in edentulous cases, and in fractures behind the wisdom tooth.

Gunning's splint may be used in these exceptional instances in which Hammond's is contraindicated; but it must be remembered that in all the very severe cases that demand the use of Gunning's splint, the upper jaw becomes the splint for the lower. The mouth is therefore closed, the act of mastication is suspended, speech is interfered with, saliva dribbles from the mouth, and there is a sense of great fatigue from the propping open of the jaws. Even the simpler forms of Gunning's splint, which do not require closure of the jaws, are more cumbrous and a greater impediment than Hammond's, and possess no advantage where both are applicable. The above considerations are of great moment to patients who rely on their daily labour for their subsistence; for enforced idleness frequently entails a condition of body and mind unfavourable to the process of repair.

I am unwilling to close this paper without making reference to one read at the last meeting of the British Dental Association in Edinburgh, by Mr. W. Campbell, upon "A Method of Treating Fractures of the Inferior Maxilla," and to which he proposed to attach his own name as "Mr. Campbell's method." The splint that he uses consists of a metal cap to fit the teeth of the lower jaw, lined with warm gutta-percha, and pressed into position. This form of splint is identical in principle with one described in Mr. Tomes' text-book of Dental Surgery (2nd edition, 1879, p. 660), which runs thus:—

"An impression of the jaw in wax or plaster is taken: . . . this is cast in plaster, and the displacement remedied by sawing through the plaster model. A gold or vulcanite plate is then made to fit the crowns of the teeth, when the halves of the jaw are reduced to their proper position. In some cases it will be best to make the splint fit loosely, and to line it with warm gutta-percha at the time of introduction; but whether this course is preferable to making the plate itself fit accurately, can be determined only by the inspection of the individual case."

A very similar description is contained in Heath's "Injuries and Diseases of the Jaws" (2nd edition, p. 39, 1872, and also in the last edition). Here the splint is spoken of as "Mütter's clamp," "modified by Mr. Tomes and others" thus: "The modification consists in making the silver cap fit accurately to the teeth, from some distance on each side of the fracture, by moulding it to a plaster cast of the jaw. The cap is then lined with gutta-percha, which, being warmed when the apparatus is applied, fills up the interstices and fixes the cap, the fragments being maintained in position whilst the application is being made."

Apart from all question of the title by which the apparatus should be known, I should always prefer Hammond's splint when it could be used; for the teeth remain free, and sight of the line of fracture is not obscured.

In conclusion, I regret that Mr. Campbell endorses and quotes an erroneous assertion of Dr. Kingsley's, in the work on "Oral Deformities," when he says, amongst other untenable objections to Hammond's splint, "Furthermore, even when the necessary teeth are *in situ*, and are sufficiently firm, it would frequently be found quite impossible to get any wire between them."

I have never failed in my attempt to pass a binding wire either between the teeth or through the gum, nor have I yet seen a dried preparation of an inferior maxilla between the teeth of which a wire could not be passed—provided, of course, that the teeth in the mouth be numerous.

## DISCUSSION.

Mr. Henri Weiss said he was sorry Mr. Hammond had not been present to hear the paper which had just been read. The testimony Mr. Pedley had given as to the value of Mr. Hammond's splint was highly complimentary to its inventor, but there were one or two points in the paper which, speaking on Mr. Hammond's behalf, he (Mr. Weiss) did not like to pass over without notice.

Mr. Pedley had spoken of the difficulty, in some cases, of getting a model of the mouth. This must be admitted to a certain extent; but it must not be forgotten that it was not necessary to obtain an accurate impression of the whole of the teeth and gums, such as was required for other purposes. An impression of the *crowns* of the teeth was all that was required. Nor was it necessary to use a tray; a piece of zinc could be readily cut and bent into shape, and would answer the purpose perfectly. On this he built up some soft wax, and had seldom any difficulty in getting a sufficiently good impression.

Then Mr. Pedley seemed to think that it was quite sufficient to fasten the splint to two or three teeth on either side of the fracture. Mr. Hammond attached great importance to distributing the pressure as much as possible, and therefore always made use of all the teeth that could be made to serve—even the wisdom teeth. For it must be remembered that however firmly implanted teeth may appear, they were easily loosened or moved by a comparatively small amount of force constantly applied, as was very likely to be the case in a broken jaw, with the usual tendency to displacement of the fragments.

Lastly, he gathered from the paper that Mr. Pedley did not attach much importance to the mode of tying, though this, again, was a point on which Mr. Hammond laid great stress ; he held that unless care was taken in this part of the operation there might be a liability for the fracture to gape at the lower edge. With regard to Mr. Pedley's partiality for the use of gold wire, he (Mr. Weiss) could only say that he found iron wire answer the purpose very well : it turned black, but was sufficiently durable, and did not cause any local irritation.

Mr. Henry Moon said it might be supposed that he would naturally be inclined to agree with the views expressed by Mr. Pedley in his paper. But he would at once admit that Mr. Hammond's method of treatment was the best, and in some cases the only one which could be used with success. He felt sure that Mr. Pedley had not the smallest intention of disparaging Mr. Hammond's invention, or his method of using it. All that was claimed for the modification of it which they had adopted at Guy's Hospital was that in cases where there was not much displacement, it gave good results, and that there was certainly a saving of trouble in not having to take a model, or to solder the ends of the wire. They fully appreciated also the advantages of Mr. Hammond's method of twisting up the binding wire ; indeed Mr. Pedley had described this at some length in the course of his paper, the general purport of which Mr. Weiss appeared to have to some extent misapprehended.

Fractures of the upper jaw were more rarely met with than those of the lower. He (Mr. Moon) had, however, met with a case in which the superior maxillary bones were separated from each other, the intermaxillary bones being also separated. There was also a transverse fracture under the orbits, and the lower jaw was broken as well. He (Mr. Moon), having secured the lower jaw by means of Hammond's splint, proceeded to fix the upper by the same means. But he found that, owing to the fractures in the malar region, there was a tendency for the jaw-bone to drop downwards and backwards, and at the end of a week he was obliged to remove Hammond's splint, and apply Gunning's. The case then progressed very satisfactorily, and recovery took place without any noticeable alteration of features.

Mr. West said he occasionally had to deal with very severe cases of fracture of the jaw at the German Hospital. He had been called upon to treat one only a few weeks since. The jaw was broken between the left central and lateral incisors, and the patient had been in hospital a fortnight before he saw him. There was a considerable amount of displacement, and the patient was subjected to fits. Hammond's splint being inapplicable, he (Mr. West) took a model, cut it across at the seat of fracture and refixed the fragments in their proper relative positions. He then made a metal cap, lined it with gutta-percha, and put this on whilst the material was soft. An aperture was cut opposite the seat of fracture, so that the position of the fragments could be seen. The result of the treatment was very satisfactory.

Mr. J. H. Redman related particulars of a case of fracture of the upper jaw, which he had been called upon to treat at the Sussex County Hospital. The patient had been struck with great violence by a block of wood thrown off by a circular saw. This made a large gash in the cheek and lip just to the right of the nose; the whole upper jaw was freely movable, and dropped considerably, being apparently held only by the soft parts; the vomer was detached from its connections with the superior maxillary and palate bones. An impression of the mouth was taken, and a vulcanite plate made to fit the upper jaw, with wings passing to the outside of the cheek on each side, and held in position by means of a four-tailed bandage. This held the jaw firmly in position, and the patient made an excellent recovery.

Mr. W. Harding said that for some years he used Gunning's splint, but lately he had adopted Hammond's, and was very much pleased with it. He could not, however, induce the surgeons attached to his Infirmary to use it, on account of the difficulty of soldering the ends of the wire.

Mr. Walter Coffin said he should be glad to know what was the best sort of binding wire to use. Mr. Pedley had recommended gold wire, but this would be found too expensive for some of the cases they were called upon to treat. He (Mr. Coffin) would suggest that probably aluminium wire would be found to answer the purpose well.

With reference to the difficulty which was sometimes met with in taking models of the mouth, he had seen it stated that a sufficiently good impression could be obtained by mixing a good quantity of pyro-phosphate of zinc, making it into the form of a roll, introducing this into the mouth with oiled fingers, holding it until set, and then removing it.

Mr. S. J. Hutchinson said he hoped Mr. Pedley would present the specimens with which he had illustrated his paper, or at all events duplicates of them, to the Museum. He thought Mr. Moon's method of fastening the ends of the wire was a valuable improvement. He should be glad if Mr. Pedley would inform him whether he found Mr. Hammond's splint as useful in cases of multiple fractures of the jaw as in the simpler cases ; and also what form of apparatus he found most satisfactory in cases where the teeth had been lost ;—did he use Gunning's splint under these circumstances ?

Mr. Storer Bennett said he was glad of the opportunity of expressing his opinion of the value of Hammond's splint, even in the worst cases. Thus he had lately been treating at the Middlesex Hospital, in conjunction with Mr. Lawson, a case of fracture of the lower jaw, which had previously been treated elsewhere for three months, but the fracture was still ununited. There was a sequestrum between the fragments ; this was removed, the ends of the bone resected, and Hammond's splint applied. Firm union then took place in about six weeks. He wished also to confirm what Mr. Pedley had said as to the importance of scaling as a preliminary operation ; it greatly facilitated the passing of the binding wire.

Mr. Pedley, having been called upon by the President to reply, said he quite agreed with Mr. Henri Weiss that a full-sized Hammond's splint was a more perfect form of apparatus than the modification of it which he had described in his paper. Still, the latter sufficed to give satisfactory results in a considerable number of cases, and it could be put on by any general practitioner, whilst an average general practitioner could not put on the full-sized Hammond's splint. So far from not having attached sufficient importance to Mr. Hammond's figure of 8 method of putting on the binding wire, he had actually quoted that gentleman's directions for applying it verbatim in his paper.

In reply to Mr. Coffin, he would say that the best wire for the purpose was what was commonly known as "binding wire," and it should be as thick as could be easily passed between the teeth.

He could assure Mr. Hutchinson that Hammond's splint was just as applicable to cases in which there were two, three, or four fractures as to those in which there was only one. It could be applied to any case in which there were firmly implanted teeth in each fragment; the wire must not, however, be attached to loose teeth or to those immediately contiguous to the lines of fracture. He was very much obliged to all those who had joined in the discussion.

The Society then adjourned.

## ODONTO-CHIRURGICAL SOCIETY OF SCOTLAND.

THE first ordinary meeting of Session 1884-85 was held on November 13th, at the Rooms, 30, Chambers Street, Mr. Andrew Wilson, President, in the chair.

The following gentlemen were balloted for and admitted members of the Society:—John Thomas Browne Mason, L.D S. Eng. Exeter; Ernest F. Cox, L.D.S. Ed., Jersey; Felix Henri Weiss, L.D.S. Eng., London.

The Curator and Librarian announced several donations to the Society's Library and Museum from Sir E. Saunders and Mr. Robert Hepburn.

The Secretary read the following paper from Dr. Norman Kingsley, New York:—

### IRREGULARITIES OF THE TEETH.

With advancing civilisation there is an apparent increase of deformities of the dental arch.

In the higher social scale it is exceptional to find a young person with a perfectly developed and regular row of teeth, set in a well-formed and rounded arch. More commonly, departures from this type will be found of every grade, more or less pronounced, exhibiting some of the phases of narrowed jaws, or teeth protruding, over-lapping, or crowded in every conceivable mal-arrangement. In many instances the cause has some direct connection with other evils that seem inseparable from a state of high civilisation.

A close observer for a generation will have seen a multitude of cases which had no apparent local cause, were not of an inherited origin, and could only be attributable to constitutional conditions developing in the individual.

As a general statement, the finer the nervous organisation, the more precocious or brilliant the intellect, the greater will be the tendency to dental deformity. The converse is true of feeble-minded people, who, having a fair physique, will show well-rounded jaws and regular dental arches. The exceptions to the latter statement are found among those cases of hopeless idiocy where the whole organisation, as well as the intellect, is depraved.

Many peculiarities are of an inherited origin so far as the individual is concerned ; but what caused the initial departure from a normal type in preceding generations would be impossible to determine. More readily, perhaps, than any other deformities of the human organisation are dental irregularities transmissible, and departures from a normal type in the parents re-appear in the children in an exaggerated form.

Irregularities that require treatment never appear in the deciduous teeth. The deciduous dental arch is always well-formed and symmetrical. It is only in the second set that deformities make their appearance, and it is exceptional that such peculiarities can be foreseen and prevented. It cannot be determined with any certainty before eruption that a dental arch is going to be abnormal, the causes being generally hidden and remote.

The normal type of the dental arch describes a regular line. The arch may be wider or narrower, varying somewhat in individuals or races, but the line will be an easy, graceful curve, without break or tendency to form an angle. Within certain limits, a narrow dental arch, as associated with certain features, may become the perfection of beauty ; while, with another form of head and face, the widest development may be equally pleasing.

That which is recognised now as the standard or full measure of beauty as well as utility is not unlike that which existed in the remotest historic ages, nor different from that which is now exhibited among all communities not degenerated by luxury or vice.

Abnormalities include such a shape of the arch as is not in harmony with the surrounding features; all crowding and twisting of the teeth; and all departures from a regular line in their positions. One form of irregularity seems to be due to unwise or premature extraction of the deciduous canines of the upper jaw. In the ordinary course of nature these teeth should be the last to drop out. If extracted long anterior to their period of shedding, the permanent bicuspids are liable to encroach upon the domain of the canines, and thus deprive them of their place in the arch. Such a mal-position can be foreseen and prevented.

Another abnormality of the superior dental arch which can be prevented is the result of thumb-sucking or its equivalent in the earlier years of childhood. The effect of such a habit is to protrude all the teeth in the front part of the mouth. This deformity will not show itself until the eruption of the permanent teeth, sometimes even after the practice which caused it may have ceased. In one instance which came under the author's observation, a mother of good social position had nursed from her breast a daughter until she was nine years old, the result being that the six upper front teeth were protruding so that the lips could not be closed. But a large proportion of dental irregularities cannot be predetermined with certainty even where there is an hereditary tendency, and can be corrected only when they develop.

An observer with limited experience may often be misled by the appearance of teeth as they first erupt. They may seem to be growing out of the line of the arch, and that a permanent irregularity is inevitable; but many such cases need no interference. If left to themselves, they will approach regularity and often assume their true positions, unless the occlusion of the antagonising teeth prevents them. But interference is demanded as soon after eruption as it becomes certain that a deformity is inevitable. There is then no longer justification for delay; for after that period every year increases the difficulties both pathological and mechanical, and prejudices the stability of the dental apparatus.

But all irregularities in the position of the teeth are not deformities which demand treatment; there are many departures from a normal type where neither the utility nor the beauty of these organs, nor the symmetry of surrounding features, is seriously affected by such mal-position.

The regulation of teeth involves often the wearing of fixtures which cannot be removed and cleansed as frequently as the health of the mouth demands. Their continued presence may provoke caries of the teeth, and a prolonged treatment may seriously impair a nervous system; therefere, regulating teeth should not be undertaken without due consideration. Such a consideration must recognise the age, sex, and family type, and the relation of the features; the cause of displacement, the constitution of the teeth, and the ravages of decay; the efficiency of the masticating apparatus, the enunciation of the voice, the risk of inflammation, and the destruction of pulps; the systemic condition and endurance of the patient; the time required and the annoyance to which he would be subjected; the means and appliances for correction; and finally, the character and permanency of the changes wrought.

Regulating teeth may be undertaken under favourable circumstances at any age short of full maturity; but, all things considered, the most desirable period to begin the correction of an extensive irregularity is when the cuspidate and second molars are fully erupted. The occlusion of the teeth is an important factor in determining the permanency of the change. All attempts at correction at any age will be folly, unless the antagonising teeth upon occlusion will serve to hold them in their new positions.

Success in treatment is based upon the fact that the teeth are placed upon the maxillæ, surrounded by vascular, elastic, bony processes, which are easily moved or absorbed under pressure, and that reproduction of bone will follow such conditions and make the teeth solid in their new locations. The possibilities under favourable conditions, within certain limits, are almost unbounded. Narrow jaws may be widened, protruding jaws made to recede, individual teeth moved considerable distances, and teeth elongated or shortened, or twisted in their sockets. The success of skilful efforts in this direction has been triumphant.

Some of the most marked cases have been where the face has been deformed by a protruding or receding jaw, either upper or lower. Strictly speaking, when this occurs with the upper jaw it is not the maxilla which is at fault, but rather the whole dental arch. Such a condition in the lower jaw is more likely to arise from a mal-articulation at the joint; but in either case, when taken at the proper age, they are quite amenable to treatment.

It is possible, in correcting deformities or irregularities in the dental arch, to create a deformity of the external features. It is not always advisable to attempt to alter the form and expression of a mouth where the condition is an inherited peculiarity—being a part of the family type—and where the change would involve prolonged effort, possible breaking up of a good articulation of masticating organs, and with the knowledge that nature will be constantly making an effort to return to the inherited type. In hereditary cases of extensive character which have been delayed until at or near maturity, we can never feel certain but that the original tendency to mal-position, so longu nbroken, will re-assert itself at any time we abandon retaining fixtures.

Upon general principles it is desirable to retain every sound tooth in the mouth, yet there are many cases of crowded dentition where the removal of a tooth upon each side of the jaw is justifiable. The retention of every tooth in the mouth is not necessary to the efficiency of the masticating apparatus, is not required to maintain the contour of the jaw, and the loss of certain teeth produces no visible external effect. The articulafion of masticating organs is of more importance than their number, and a limited number of grinding teeth fitting closely upon occlusion will be of greater benefit to the individual than a mouthful of teeth with the articulation disturbed.

In an abnormality arising from the mixing of inharmonious types, as the small jaw of one parent with the large teeth of the other—resulting in a crowded condition—it is very doubtful if the arch can be made regular without the extraction of some of the teeth. It requires a judgment founded upon long experience to decide always upon the wisdom of extraction, and when such conviction is reached one may be equally at a loss as to the choice of teeth to be removed. It is a disputed point which of the teeth behind the canines can best be spared from the mouth. There are so many considerations to be taken into account that it is hardly possible to lay down any rule of universal application. If the sixth-year molars are badly decayed, their removal would be indicated. If they were sound, and also the bicuspids, there might be no greater reason for their removal than either of the bicuspids.

In fact, sound molars in the jaw are of more value as masticating organs than equally sound bicuspids.

As a rule, extraction of any teeth from a pinched or **V**-shaped jaw before it is widened would be likely to prove bad practice. Certainly, the extraction of any teeth from the sides of the jaw in such cases for the purpose of correcting or improving the condition without immediate subsequent steps being instituted to widen the arch, would be most unscientific and detrimental. Cases are not uncommon which show that a pair of any of the teeth in the mouth may be removed to correct an irregularity, excepting the canines of both jaws and the superior central incisors. It would be an inconceivable case which would justify the extraction of the superior central incisors; but the upper lateral incisors and any pair of the lower incisors may be removed in certain cases without serious detriment to the appearance of the mouth.

The most frequent exhibition of irregularity in the lower jaw is confined to the incisors and canines. The canines are too prominent, and the incisors are crowded and lapping. Most of such cases cannot be corrected by enlarging the arch; the overlapping of the superior incisors forbids. The remedy is comparatively simple. The extraction of one of the centrals is indicated. This will give the required room, and enable the canines to be drawn in; and at the same time the space made by extraction is closed. No matter what the mal-arrangement of the incisors may be, it is almost always better to extract one of the centrals to correct it. When the irregularity is corrected the extracted tooth will never be missed.

The treatment of irregularities is almost entirely mechanical. To the anatomical, physiological, and pathological knowledge required of the operator, there must be added a knowledge of mechanism and an ingenuity to apply it. Levers, pulleys, inclined planes, wedges and elastics singly and in combination are required for this purpose. It is quite impossible for one to overcome a complicated case of irregularity who has not a comprehension of each and all of these instrumentalities.

So far as pressure itself is concerned it is immaterial from whence it is derived. The same weight, force, or power will produce the same result. It is only a matter of convenience what source shall be employed. For widening a narrowed arch, a jack screw is the most effective means, and can be used to spread one tooth only or all the teeth on both sides according as it is applied. Wedges driven between the teeth will enlarge the arch. Levers with elastics are used to twist teeth in their sockets, and an inclined plane can be made to move teeth laterally.

The application of such apparatus to the movement of teeth is one of the most responsible duties the dentist is called upon to perform. Each and every one of these mechanical powers can be made to do his bidding, and equally each one of them may become a formidable engine of disaster. When applied in the mouth they should have constant watchfulness and care. Not one of them but, in the hands of empirics, would cause the destruction of those valuable organs they can be made to conserve.

The PRESIDENT said the Society was much indebted to Dr. Kingsley for the paper just read, and he would propose that any remarks which it might elicit should be posponed till their next meeting, by which time they would have the printed paper in their hands.

The treatment of the subject in the paper having, as explained in Dr. Kingsley's note, been necessarily general, he would suggest that as it was now some time since the treatment of "Irregularities of the Teeth," &c., had been before them, it would be desirable that those members who took a special interest in the subject, and who had been treating cases, and more especially complicated ones, according to the more advanced methods, should bring models, &c., of such cases with them, so that the discussion might go more into details than if it were restricted to the paper.

The Secretary brought forward two models from Mr. Finlayson of a case under his care. The patient, a girl of eleven, possessed a perfectly sound set of teeth, and unusually complete for her years, wanting only in the wisdom teeth and an upper second molar. The arches were fairly well formed, but when the mouth was shut the upper teeth were in advance of the lower to an undue extent, so that the lowers, instead of articulating normally with the uppers, closed one tooth further back. Dr. Kingsley had been shown the models, and after examining them suggested that a suitable course to follow in such a case, was what he termed "jumping the bite." This might be effected by wearing a plate secured to the teeth of the upper jaw, so constructed that on the closure of the mouth the lower teeth bit upon an inclined plane.

By such means he had often succeeded in rectifying a mal-articulation.

The advisability of this plan, or the other alternative—that of accommodating the upper to the lower by the removal of two bicuspids and drawing in the front teeth—was discussed by the meeting.

The President exhibited two models of the lower jaw of a gentleman aged about 35, showing the presence of *three* bicuspids on *each* side. The history of the case was somewhat curious. When he first saw it, now fully two years ago, the supernumerary tooth on the left side was present, occupying the space between the second bicuspid and the second molar (the first molar on both sides having been removed many years before), and on the right side the second bicuspid was in close relation to the second molar, which latter was much decayed. The first model showed this stage.

Fully a year elapsed when he was called on to remove the right second molar, the roots of which were very well developed. This was followed, after an interval of some months, by the eruption of a bicuspid in its place.

The form of the extra bicuspids was, as they would see from the second model, quite normal, only slightly compressed, and they were one quarter rotated, evidently the result of want of room during development.

He might add that the same gentleman had a conoid supernumerary tooth on each side of the upper jaw. These occupied the usual position on the buccal surface of the third molar.

The President then announced that their next meeting would be on the second Thursday in December (the 11th), when, as agreed to, the discussion would be on Dr. Kingsley's paper, coupled with the more recent modes of treating irregularities.

HYDROCHLORATE OF COCAINE is a new local anæsthetic that is attracting considerable attention at the present time. It has hitherto been chiefly used in ophthalmic surgery, a two per cent. solution being dropped into the eye. After three applications anæsthesia is, as a rule, complete. Its use in Dentistry is being experimented upon, and in a little time some definite information will be obtainable. At present it is very expensive—2s. 6d. per grain.

# Editorial.

## THE DIPLOMA TRAFFIC.

In the "Journalistic Summary" for October, page 477, reference is made to the irregular issue of Dental Diplomas by certain American Colleges. It was stated that considerable space had been occupied by the subject in the June, July and August numbers of the *Independent Practitioner*, and that the two institutions accused in the present instance were the Baltimore College of Dental Surgery, and the Dental Department of the University of Maryland. Dr. B. M. Hopkinson, who has written to us upon the subject, says, that "while the charges brought against the former institution are unquestionably beyond doubt (and acknowledged by the Faculty of the Baltimore College of Dental Surgery), there never has been the slightest intimation of irregularity concerning the latter, save in the attempted defence . . . . . in which the Baltimore Faculty tried to mitigate their wrong doing by endeavouring to implicate others in the same unfortunate business, which proved to be manifestly weak and untrue."

We readily take advantage of the explanation of the position of affairs as given us by Dr. Hopkinson, and trust the University of Maryland will not only maintain its unsullied fame, but prove to be a paragon to its neighbour.

The loose manner in which degrees are conferred by certain Dental Colleges in the United States is notorious. Justice and good faith to those graduates who have complied with the educational requirements are looked for, and the honour and status of the Dental Profession demand their careful keeping. The bold course of action taken in this matter by the *Independent Practitioner* deserves the thanks of the Profession at large.

## GOSSIP.

A work on "Surgical Handicraft," by Walter Pye, F.R.C.S., has just been published. It contains a chapter on the Extraction of Teeth, by Mr. H. Howard Hayward, and one on the Administration of Anæsthetics, by Mr. Joseph Mills. Fracture of the jaws receives some consideration, and Mr. Hayward has also contributed to this chapter. It is worthy of note that mention is not made of Hammond's splint. The application of this splint does not necessitate the "special mechanical knowledge" that the making of an interdental splint does, therefore a description of it would have added to the value of the book as a surgeon's manual.

A CURIOUS case lately occurred in one of the law courts of San Francisco. A Dentist had agreed to fill the teeth of a patient for 17 dols. 50 cents, but after the work was done he made his fee 22 dols. 50 cents. The payment of this sum was refused, and he forcibly returned the fillings. In the action for damages which was instituted by the patient, a verdict was given against the Dentist for 217 dols. 50 cents, together with the costs of the suit.

THE *Dentists' Register* for 1885 is now being prepared. The proof sheets show that several Licentiates in Dental Surgery have not registered their qualification; and also that some Dentists possessing additional surgical qualifications have not yet had those titles entered upon the *Dentists' Register*. There is time, even now, for such addenda to be made.

THE Dental Manufacturing Company desire to inform the profession that they have appointed Mr. Bennett (who is already known to practitioners in the north of England and Scotland) as their traveller, in the place of the late Mr. R. A. Howell, whose loss is so widely regretted.

THE poison glands and emissive ducts of the fishes *Trachinus draco* and *Trachinus vipera* have been discovered by Dr. Gressin and M. Bottard, of Havre. The venom, extracted and injected by means of a Pravez syringe into frogs, fishes, birds, and small mammals, quickly brought on clonic convulsions, collapse, and death. The opercular spines serve for the introduction of the poison; the mechanism is exactly the same as in the viper, only the spines, instead of having merely one channel like the poison fang of a snake, have each two.

AT the late conference at Washington for the establishment of a prime meridian, it was determined that as a prime universal meridian that of Greenwich should be adopted; also that there should be a universal time reckoned from Greenwich, and that the origin of day should be taken at mean midnight at Greenwich on the first meridian, counting from one to twenty-four hours. It was hoped that the railway companies would adopt the new method of measuring time, and instead of the designations A.M. and P.M., the hours in the time-tables would run from one to twenty-four.

THE END OF VOL. IV

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